FRYINGPAN-ARKANSAS PROJECT, COLORADO

HEARINGS

BEFORE THE

SUBCOMMITTEE ON IRRIGATION AND RECLAMATION

OF THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS HOUSE OF REPRESENTATIVES

EIGHTY-FOURTH CONGRESS

FIRST SESSION

ON

H. R. 412

TO AUTHORIZE THE CONSTRUCTION, OPERATION, AND MAINTENANCE BY THE SECRETARY OF THE INTERIOR OF THE FRYINGPAN-ARKANSAS PROJECT, COLORADO

MAY 9, 11, 12, AND 18; JULY 1 AND 16, 1955

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FRYINGPAN-ARKANSAS PROJECT, COLORADO

MONDAY, MAY 9, 1955

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D. C.

The subcommittee met, pursuant to call, at 10 a. m., in the committee room, New House Office Building, Hon. Wayne N. Aspinall (chairman) presiding.

Mr. ASPINALL. The committee will be in session this morning for the consideration of H. R. 412, by our colleague, Congressman Chenoweth, of the Third Congressional District of Colorado, to authorize the construction, operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas project, Colorado.

This legislation would authorize the multipurpose Fryingpan-Arkansas project for furnishing supplemental irrigation water and municipal water, controlling floods on the Arkansas River, supplying electric energy and other incidental purposes. With respect to supplemental irrigation water, about 183,000 acre-feet would be made available for 322,000 acres through transmountain diversion of about 69,000 acre-feet, conservation of flood flows, reregulation of winter flows and reuse of return flows. With respect to municipal water supply, 17,500 acre-feet would be made available to meet the rapidly expanding needs of Colorado Springs and several additional Arkansas Valley towns. With respect to flood control, a large part of the flood damages, which under present conditions occur between Pueblo and the existing John Martin Reservoir, would be prevented. With respect to electric power, about one-half billion kilowatt-hours of electric energy would be produced annually from the hydroelectric power facilities included in the plan. In addition to the above, the development would also provide sediment control, stream pollution abatement and preservation and propagation of fish and wildlife of the area.

The Fryingpan-Arkansas project has been under study by the Department of the Interior for many years. The Department completed its planning report in 1951 and submitted this report to the Congress in June 1953, after it had been reviewed by all the affected States. The Department's report, including findings and recommendations, is printed as House Document 187, 83d Congress. The Department and the administration recommend that the Fryingpan-Arkansas project be constructed. Legislation to authorize the Fryingpan-Arkansas project was reported by this committee in the 83d Congress but failed to pass the House. Similar legislation passed the Senate in the 83d Congress.

There are hearings of the Senate committee for the 83d Congress and the 84th Congress and hearings of the House committee in the 83d Congress available for the members of this committee to study while we are considering this legislation. It is the hope of the Chair that the hearings at this time will not go into needless repetition of that testimony which is to be found in the record of the hearings as referred to. However, whatever the Bureau and the proponents and opponents wish to place before the committee will most certainly be received.

It is the program of the Chair that today, that is until this noon, will be given to the administration departmental spokesmen, and there will be no meeting this afternoon; that when we convene Wednesday the proponents will take the witness stand and present their testimony—it is the hope that we may be permitted to meet Wednesday afternoon—and that Thursday the opponents will take the stand and present their testimony.

At this time, unless there is an objection the departmental report, signed by the Assistant Secretary of the Interior Fred G. Aandahl, under date of April 4, 1955, will be made a part of the record. Also the bill itself will be printed at this place in the hearing unless there is an objection.

Hearing none, it is so ordered.

(H. R. 412 and the departmental report follow:)

[H. R. 412, 84th Cong., 1st sess.]

A BILL To authorize the construction, operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas project, Colorado

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of supplying water for irrigation, municipal, domestic, and industrial uses, generating and transmitting hydroelectric power and energy, controlling floods, providing for the preservation and propagation of fish and wildlife, and preserving and improving recreational opportunities, and for other useful and beneficial purposes, the Secretary of the Interior, acting pursuant to the Federal reclamation laws, Act of June 17, 1902 (32 Stat. 388), and Acts amendatory thereof or supplementary thereto, as far as those laws are not inconsistent with the provisions of this Act, and subject to the apportionments of the use of water fixed in the Colorado River Compact and the Upper Colorado River Basin Compact and to the terms of the Boulder Canyon Project Act, and to the terms of the United States-Mexico Water Treaty of 1944 (Treaty Series 994), is hereby authorized to construct, operate, and maintain the Fryingpan-Arkansas project, Colorado, in substantial accordance with the engineering plans therefor set forth in Senate Document Numbered 106, Eighty-second Congress, second session, but with such modifications of, omissions from, or additions to the works therein described as the Secretary may, from time to time, find necessary or proper for accomplishing the objectives of the project.

SEC. 2. (a) Contracts to repay that portion of the cost of the Fryingpan-Arkansas project which is allocated to irrigation and assigned to be repaid by irrigation water users (exclusive of such portion of said cost as may be derived from temporary water supply contracts or from other sources) shall be entered into pursuant to subsection (d), section 9, of the Reclamation Project Act of 1939 (53 Stat. 1187), and may provide that the general repayment obligation shall be spread in annual installments, which may be varied as to any required annual payment in the light of economic factors affecting the ability of the contracting organization to pay and of water supply and water requirement conditions, but in number and amounts satisfactory to the Secretary, over a period of not more than seventy years, which period shall be inclusive of any permissible development period, for any project contract unit or for any irrigation block, if the project contract unit be divided into two or more irrigation blocks.

(b) Notwithstanding any provision of law to the contrary, net revenues derived from the sale of commercial power and from the furnishing of water for municipal, domestic, and industrial use shall first be applied to the amortization, with interest, of those portions of the actual cost of construction of the project which are allocated, respectively, to commercial power and to municipal, domestic, and industrial water supply and shall thereafter be applied to amortization of that portion of said actual cost which is allocated to irrigation but which is beyond the ability of the irrigation water users to return during the period hereinbefore specified. The interest rate on the unamortized balance of the commercial power and the municipal, domestic, and industrial water supply allocations shall be equal to the average rate (which rate shall be certified by the Secretary of the Treasury) paid by the United States on its long-term loans outstanding on the date of this Act.

(c) No part of the specific municipal water-supply systems described in Senate Document Numbered 106, Eighty-second Congress, shall be constructed by the Secretary in the absence of evidence satisfactory to him that it would be infeasible for the communities involved to construct such works themselves, singly or jointly. In the event it is determined that such facilities are to be constructed by the Secretary, a contract providing, among other things, for payment of the actual cost thereof with interest and repayment period as hereinbefore provided, and as rapidly as is consistent with the contracting parties' ability to pay, and for assumption by the contracting party or parties of the care, operation, maintenance, and replacement of the works shall be a condition precedent thereto.

(d) No contract for a supplemental water supply for irrigation under this Act shall contain any restrictions respecting the right to receive such supply based upon ownership of irrigable lands, nor shall the excess land provisions of the Federal reclamation laws be applicable to lands served by the Fryingpan-Arkansas project which now have an irrigation supply from sources other than a Federal reclamation project.

SEC. 3. The Fryingpan-Arkansas project shall be operated under the direction of the Secretary of the Interior in accordance with the operating principles set forth on pages 20–23 of Senate Document Numbered 106, Eighty-second Congress. The Secretary may appoint the two representatives of the United States to the Commission referred to in paragraph 17 of said principles and may adopt modification thereof upon the recommendation of the Commission: *Provided*, That such recommendations are made and adopted by said Commission in conformity to the provisions of paragraph 17 of said operating principles.

SEC. 4. Any and all benefits and rights of western Colorado water users in and to water stored in the Green Mountain Reservoir, Colorado-Big Thompson project, as described, set forth, and defined in Senate Document Numbered 80, Seventy-fifth Congress, first session, shall not be impaired, prejudiced, abrogated, nullified, or diminished in any manner whatever by reason of the authorization, construction, operation, and maintenance of the Fryingpan-Arkansas project authorized by this Act.

SEC. 5. Any provision of law to the contrary notwithstanding, the project herein authorized shall be operated in such a manner that those in eastern Colorado using project water imported from the Colorado River Basin for domestic purposes shall have preference over those claiming or using the water for any other purpose.

SEC. 6. The Secretary is authorized to plan, construct, operate, and maintain public recreational facilities on lands withdrawn or acquired for the development of the Fryingpan-Arkansas project, to conserve the scenery, the natural, historic, and archeologic objects, and the wildlife on said lands, and to provide for public use and enjoyment of the same and of the water areas created by these projects by such means as are consistent with the primary purposes of said project and to mitigate losses of and improve conditions for the propagation of fish and wildlife in connection with the development of the Fryingpan-Arkansas project. The Secretary is authorized to acquire lands and to withdraw public lands from entry or other disposition under the public land laws for the construction, operation, and maintenance of recreational facilities in connection with the said project, and to dispose of them to Federal, State, and local governmental agencies by lease, transfer, exchange, or conveyance, upon such terms and conditions as will best promote their development and operation in the public interest. The costs, including the operation and maintenance costs of all said undertakings, shall be nonreimbursable and nonreturnable under the recla-

mation laws, and funds appropriated for carrying out the authorization contained in section 1 of this Act shall, without prejudice to the availability of other appropriated moneys for the same purpose, also be available for carrying out the investigations and programs authorized in this section.

SEC. 7. (a) The use of water diverted from the Colorado River to the Arkansas River Basin through works constructed under authority of this Act shall be subject to and controlled by the Colorado River Compact, the Upper Colorado River Basin Compact, the Boulder Canyon Project Act, and the Mexican Water Treaty (Treaty Series 994), as hereinbefore provided, and shall be included within and shall in no way increase the total quantity of water to the use of which the State of Colorado is entitled and limited under said compact, statute, and treaty, and every contract entered into under this Act for the storage, use, and delivery of such water shall so recite.

(b) All works constructed under authority of this Act, and all officers, employees, permittees, licensees, and contractees of the United States and of the State of Colorado acting pursuant thereto, and all users and appropriators of water of the Colorado River system diverted or delivered through the works constructed under authority of this Act and any enlargements or additions thereto shall observe and be subject to said compacts, statute, and treaty, as hereinbefore provided, in the diversion, delivery, and use of water of the Colorado system and such condition and covenant shall attach as a matter of law whether or not set out or referred to in the instrument evidencing such permit, license, or contract and shall be deemed to be for the benefit of and be available to the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming and the users of water therein or thereunder by way of suit, defense, or otherwise in any litigation respecting the waters of the Colorado River system.

(c) None of the waters of the Colorado River system shall be exported from the natural basin of that system by means of works constructed under authority of this Act, or extensions and enlargements of such works, to the Arkansas River Basin for consumptive use outside of the State of Colorado, and no such waters shall be made available for consumptive use in any State not a party to the Colorado River Compact by exchange or substitution, or, as far as the same is controllable through the operation of works herein or hereafter authorized, by use of return flow.

(d) No right or claim of right to the use of the waters of the Colorado River system shall be aided or prejudiced by this Act, and the Congress does not, by its enactment, construe or interpret any provision of the Colorado River Compact, the Upper Colorado River Basin Compact, the Boulder Canyon Project Act, or the Mexican Water Treaty or subject the United States to, or approve or disapprove any interpretaton of, said compacts, statute, or treaty, anything in this Act to the contrary notwithstanding.

SEC. 8. There are hereby authorized to be appropriated, out of any moneys in the Treasury not otherwise appropriated, such sums as may be necessary to carry out the purposes of this Act.

DEPARTMENT OF THE INTERIOR,
Washington D. C., April 4, 1955.

Hon. CLAIR ENGLE,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington D. C.

MY DEAR MR. ENGLE: This is in response to your request for an expression of the views of this Department on H. R. 412, a bill to authorize the construction, operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas project, Colorado.

Enactment of legislation to authorize construction of this project was recommended by the President in his message accompanying the budget for the fiscal year 1956 (H. Doc. No. 16, 84th Cong.). In that message, the President referred to this proposed development and the Colorado River storage project as "two comprehensive river-basin improvements which are beyond the capacity of local initiative, public or private, but which are needed for irrigation, power, flood control, and municipal and industrial water supply." He also pointed out that "Sale of power generated at these developments will repay the power investment within 50 years and will make a contribution toward repayment of other invest-

ments." In the budget itself (p. 830) it is pointed out that the Administration proposes to initiate construction of the Fryingpan-Arkansas project during the next fiscal year if it is authorized and that the budget includes an item for funds to be requested for this purpose.

A rather full description of the engineering features of this proposed undertaking, of the purposes which it will serve, and of the benefits which will be associated with it are readily available in Senate Document No. 106, 82d Congress, and in the report of the Department of the Interior on the project which was submitted on June 9, 1953, to the President of the Senate and the Speaker of the House of Representatives in accordance with the provisions of section 9 (a) of the Reclamation Project Act of 1939 and printed as House Document 187, 83d Congress. The present report notes certain modifications in the engineering plan for the project set out in House Document 187 and includes revisions in its estimated costs and in its financial and economic analyses to bring them up to date. It also proposes certain modifications in the repayment program set out in House Document 187.

For convenient reference by the Committee, the purposes and expected accomplishments of the project may be summarized thus: The project contemplates (1) diversion through the project works from the Roaring Fork River Basin in western Colorado to the Arkansas River Basin in eastern Colorado of approximately 69,000 acre-feet of water per annum; (2) diversion through the existing works of the Twin Lakes Co. of about 15,000 acre-feet per annum over and above what that company now diverts; (3) storage on the eastern slope for the waters thus imported and, in addition, for eastern slope floodwaters and winter flows averaging 50,000 and 93,000 acre-feet per annum, respectively. This water will make possible the furnishing of supplemental irrigation water for 322,000 acres of irrigated land not having an adequate water supply and will supply expanding needs for municipal, domestic, and industrial water in the upper Arkansas Basin. The project will prevent a large part of the flood damages which, under present conditions, occur between Pueblo and John Martin Reservoir. In accomplishing these primary purposes of the project, works will be provided for the generation of an average of 505 million kilowatt-hours of hydroelectric power annually.

An important feature of the project is the 28,000 acre-foot Aspen Reservoir on the western slope. This reservoir, the cost of which is included in the cost of the project, will serve to assure present and potential western slope water users that the proposed diversion of water to the eastern slope will not deprive them of water to the use of which for domestic, irrigation, and manufacturing purposes (including power generation in the case of existing rights) rights now exist or are hereafter acquired pursuant to the laws of the State of Colorado. A rather elaborate set of operating principles for this and other features of the project, in the formulation of which representative spokesmen for various interests within the State of Colorado participated and which was approved by the Colorado Water Conservation Board, is incorporated in the bill by reference. These operating principles will, accordingly, constitute a portion of the law of the project and will not be subject to change save by further act of Congress or, as provided in section 3 of the bil, by the Secretary's adoption of modifications thereof recommended by a commission composed of representatives of the contemplated Eastern Colorado Conservancy District, the Colorado River Water Conservation District, the Colorado Water Conservation Board, and the United States.

Since the publication of Senate Document No. 106 the Department of the Interior has reviewed the project, and certain modifications in the repayment proposals contained in that Document have been recommended. These are included in our report to the President of April 30, 1953, which is one of the documents comprising the report which was sent to the Congress as noted above, on June 9, 1953. Since that time, additional studies have been conducted in the field, based upon construction cost estimates adjusted to October 1954 conditions, new policies on cost allocations, revisions in the estimates of project revenues (especially those derived from power and the conservancy district tax), and a new alinement of municipal water requirements and facilities, notably elimination of the large treatment plant as a Federal project feature. As compared with the 69-year payout period incorporated in the Secretary's report of April 30, 1953, the new studies show that all reimbursable project costs can be repaid in approximately 60 years, including an 8-year period during which construction is being completed and project revenues are being built up to normal.

The following tabulation indicates the major changes in project costs and allocations as a result of the new studies:

	H. Doc. 187	December 1954
Irrigation	$75,128,000	$67,653,000
Maintenance and irrigation water:		
Delivery features	21,500,000	16,328,000
Other	11,154,000	8,200,000
Power	41,945,000	44,551,000
Flood control	20,341,000	17,911,000
Fish and wildlife	2,830,000	1,898,000
Total	172,898,000	156,541,000
Power revenues:		
Firm power rate, mills	5.5	6.0
Net annual revenues	$1,504,400	$1,720,200
Conservancy district revenues:		
Irrigation	$622,000	[1] $657,000
Maintenance and irrigation	$1,064,000	[1] $855,000
Benefit cost ratios:		
Direct benefits only	1.05 to 1	1.05 to 1
All benefits	1.48 to 1	1.47 to 1

[1] Including tax levy.

In view of the above, we recommend that the word "sixty" be substituted for the word "seventy" in line 5, page 3, of the bill.

Enactment of section 2 (d) of the bill would exempt from the excess-land provisions of the Federal reclamation laws all lands served by the Fryingpan-Arkansas project "which now have an irrigation water supply from sources other than a Federal reclamation project. This provision raises policy questions which your committee will wish to consider. While the provisions of the bill are not unprecedented—witness, for one example, the exemption by the act of June 16, 1938 (52 Stat. 764), of lands of the Colorado-Big Thompson project—there must be considered the relative weight of such considerations as the substantial benefits from other project sources which the irrigators will be receiving and, on the other hand, the desirability of not disturbing those farms of an existent agricultural economy which already receive a substantial portion of their water requirements from nonproject sources. It might be that your committee would wish to consider as an alternative to section 2 (d) a suggestion that the contracting agency or the excess landowners be permitted to elect either to comply with existing law or, if they do not wish to do so, to repay the portion, with interest, which is assignable to their excess lands over the period permitted by the bill.

The area affected by the proposed project is an area containing outstanding fish and wildlife resources. The principles of operation approved by the Colorado Water Conservation Board, mentioned previously in this letter, will safeguard the highly important sports fishery on the western slope by providing for certain specified minimum flows in the Roaring Fork and Fryingpan Rivers. This Department expects also to work out operating plans to protect, to the fullest extent practicable, the potentially important sports fishery resources in the headwaters of the Arkansas River on the eastern slope. This area is relatively close to population centers in east central Colorado and is subject to heavy sportsmen use. The inclusion of preservation and propagation of fish and wildlife as one of the purposes of the project in section 1, together with authority provided in that section and section 6 to make reasonable modifications in the project plan for protection of fish and wildlife resources, will enable this Department to complete the detail of its planning for the conservation of these resources so that the entire project will be sound from the fish and wildlife standpoint. Such changes for the protection of fish and wildlife resources as the Department may find desirable to carry out under the authority of the bill will be principally in the plan of operation, not of construction, of the project and will not result in any significant increase in project cost. H. R. 412 provides the flexibility needed to carry out the investigations and planning for protection of fish and wildlife resources that are required in the post-authorization stage.

Lack of clear-cut legislative authority has in the past handicapped this Department in carrying out a program for the provision of at least basic recreation facilities at reclamation reservoirs. By basic facilities, we mean those essential to access, sanitation, and the protection of people and public property.

The Congress gave the Corps of Engineers broad authority with respect to the development of recreation facilities at reservoirs under its control in section 4 of the Flood Control Act of 1944 (58 Stat. 887, 889, 16 U. S. C., sec. 460d), as amended. Experience shows that large numbers of people come to these reservoirs and that their health, protection, and safety, as well as the protection of Government property, require the provision of minimum basic facilities. It should be observed, however, that while Bureau of the Budget Circular A–47, issued December 31, 1952, contemplates the construction and operation of public-recreation facilities in connection with Federal projects, it also contemplates allocation of the cost of "minimum basic facilities and services for protection of the program or project area and the accommodation or protection of the visiting public" to the project's other purposes and, except in those cases where they create benefits of national significance, reimbursement of the cost of facilities beyond these (including access roads) by the State concerned or by local interests. This Department is inclined to encourage, to the greatest extent practicable, development of public recreation facilities on lands withdrawn or acquired in connection with the development of water resources projects, and believes that there should be one uniform national law governing the development of recreation resources. This is a matter which I am sure your committee will wish to consider carefully. The Department of the Interior will appreciate any guidance which can be furnished by the Congress on this subject.

Subject to the above discussions, the Department of the Interior recommends enactment of H. R. 412.

The Bureau of the Budget has advised that the above report is without objection.

Sincerely yours,

FRED G. AANDAHL,
Assistant Secretary of the Interior.

Mr. ASPINALL. As stated by the Chair at the beginning of this meeting, this legislation is presented to Congress through the efforts of our colleague and fellow member of this committee, Hon. J. Edgar Chenoweth, who has a statement which will be received at this time in explanation of his position and of his support of the bill. It will be the only statement in support of the bill by proponents that will be received this morning.

We are glad to have you before our committee.

Mr. ENGLE. May I join the chairman in welcoming our colleague on the committee, the most senior junior member of our committee, in times past having served on the Rules Committee where he was a tower of strength to those of us who tried to take water and power legislation through that distinguished committee. We hope that sometime he can return there to continue the very beneficial influence he had on that group, where it is very much needed. We are glad, though, he is here.

I would say to his people from Colorado that he does an energetic and persistent job in support of the project which means so much to them.

STATEMENT OF HON. J. EDGAR CHENOWETH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Mr. CHENOWETH. Thank you, Mr. Engle. I deeply appreciate your kind remarks.

Mr. Chairman and my colleagues on the committee, I would like to submit this statement and have it printed in the record at this point.

Mr. ASPINALL. Unless there is an objection, the statement of Congressman Chenoweth will be received and made a part of the record.

(The statement referred to follows:)

STATEMENT OF J. EDGAR CHENOWETH, MEMBER OF CONGRESS, THIRD DISTRICT, COLORADO

Mr. Chairman and my colleagues on the committee, I appear today in support of H. R. 412, a bill I have introduced authorizing the construction of the Fryingpan-Arkansas transmountain water diversion project in Colorado. The Senate Committee on Interior and Insular Affairs has reported favorably S. 300, a companion bill.

This is the second time that this committee has considered this project. Hearings were held in the 83d Congress on H. R. 236, a similar bill which the committee reported favorably last year. The Senate last year passed a companion bill, S. 964. However, the House by a very close vote refused to consider this legislation.

This project provides for the transmountain diversion of surplus water from the Colorado River Basin in western Colorado to the Arkansas Valley in eastern Colorado. The transmittal letters and full details of the project are contained in House Document No. 187 of the 83d Congress, 1st session.

This is a multiple-purpose project and provides for supplemental irrigation water, domestic water, electric power and flood control. It will make available to the Arkansas Valley in Colorado approximately 183,000 acre-feet of additional water per year. This amount includes 70,000 acre-feet of new water which will be diverted from the western slope to eastern Colorado. Three reservoirs and seven powerplants will be constructed. The reservoirs will capture intermittent flood flows of the Arkansas River and make possible the regulation of this water.

There is a desperate shortage of water in southern and southeastern Colorado. This area is now suffering from one of the worst droughts in history. The Arkansas Valley is one of the most productive irrigated sections of Colorado. However, there was a short crop last year, and the prospects are even worse this year. I personally visited this section just 2 weeks ago and found the situation to be critical. It is the purpose of this project to make supplemental water available for some 322,000 acres of irrigated land in this area, which in many cases will be the difference between a crop and no crop at all.

This project has been under consideration for many years. The Bureau of Reclamation has made comprehensive surveys of this entire area and the project has had exhaustive study and planning. It is the culmination of the dreams and efforts of many persons, both in and out of the Federal Government, who long ago recognized the necessity for obtaining additional water for the Arkansas Valley.

Mr. Chairman, this project has had the approval of two administrations. The project report was first approved by Mr. Oscar L. Chapman, then Secretary of the Interior, on May 4, 1951. It was again approved by Mr. Douglas McKay, Secretary of the Interior, on April 28, 1953.

This project has been recommended by the President of the United States. In his budget message this year the President said:

"I also recommend enactment of legislation authorizing the Bureau of Reclamation to undertake construction of two comprehensive river-basin improvements which are beyond the capacity of local initiative, public or private, but which are needed for irrigation, power, and flood control, and municipal and industrial water supply. These are the upper Colorado River Basin development in the States of Colorado, Utah, Wyoming, Arizona, and New Mexico, and the Fryingpan-Arkansas development in Colorado."

In a recent appearance before this committee Secretary McKay stated that the Bureau of Reclamation is ready to start construction of this project immediately upon authorization.

This project received the unanimous approval of the Colorado Water Conservation Board which agency is authorized to speak officially for the State of Colorado on all water matters. Under the supervision and direction of this Board an operating agreement was worked out between the water users of the western and eastern slopes of Colorado. The details of this agreement are contained in House Document No. 187, 83d Congress, to which I have referred. These operating principles will be fully explained to the committee by witnesses who will follow.

This project has also been approved by the Colorado River Conservation Board and the Southwestern Colorado Conservation District Board. These

are the only boards in western Colorado which are officially charged with the responsibility of protecting the water rights of their respective areas on proposed water diversions.

There is also a shortage of water in southern Colorado for domestic purposes. The city of Pueblo, second largest city in the State and the industrial center of Colorado, is in dire need of additional water. Pueblo is the home of the Colorado Fuel & Iron Corp. which operates the Minnequa steel plant, one of the important steel plants of the country. The second largest Army ordnance depot in the United States is located at Pueblo. The city of Colorado Springs has been spending large sums to obtain additional water and will receive water under this project. There are other cities and towns in the Arkansas Valley in desperate need of additional domestic water, who are anxious to purchase water that will be made available by this project.

This project will make additional electrical energy available to southern Colorado, which is badly needed at this time. I have in my district four rural electric cooperatives, all of which are seeking additional and cheaper power. This project has the enthusiastic support of the Colorado State Association of REA Cooperatives, and also the support of the National Rural Electric Cooperative Association. The project is also supported by the private utilities serving this area.

I want to emphasize that this project deals only with water that belongs to the State of Colorado and no other State is affected. Colorado is not now using the full amount of water allocated to her under the Colorado River compact, and the upper Colorado River compact. Colorado furnishes more than 70 percent of the water in the Colorado River. All we seek in this project is to make beneficial use of 70,000 acre-feet of water in the Colorado River Basin which have been allocated to Colorado. Not a drop of water will be taken that belongs to any other State.

There have been some changes in this project since it was considered by the committee last year, as a result of which the costs have been reduced from an estimate of $172,898,000 to $156,541,000. I think a splendid job has been done by the Bureau of Reclamation in the planning, investigation, and report on this project. This project is economically sound and feasible. The figures have been checked by outside engineers and have been found to be correct. This is a good project and deserves to be included in our reclamation program.

Mr. Chairman, the presence here today of this large number of witnesses from Colorado is the best proof of the intense interest in this project. The prolonged drought in Colorado has emphasized the necessity for immediate action.

Mr. Chairman, I respectfully urge this committee to report favorably H. R. 412 and to again approve the authorization of the Fryingpan-Arkansas project. I am hoping that Congress will authorize this project at this session. I have tried to impress upon the committee the importance of this project to the people of Colorado, and the desperate need for the water this project will provide.

Mr. CHENOWETH. Mr. Chairman, I appreciate this opportunity to speak briefly, as I want the Bureau witnesses to take the time as you suggested.

First, I want to thank you, Mr. Chairman, for arranging this hearing. I know that you are aware of the intense interest in Colorado in this project, and the presence here today of this large number of witnesses from Colorado is the best proof, I think, that the committee would want of the interest in the project and of the feeling that there is a desperate need for this project at this time.

I want to thank you, Mr. Engle, for your very kind remarks. I assure you I am greatly enjoying my association with you and the other members of this committee. It is a great pleasure to serve with you. This is in many ways, of course, the most important committee of the House so far as the West is concerned, and I have been very happy to have this opportunity to be associated with you.

It will not be necessary for me to make any further statement, I think, Mr. Chairman. You and Mr. Engle and the other members of the committee who have served on the committee previously are

familiar with the project and what it involves, and the details, and just what it proposes to do.

For the benefit of the new members, I just wish to say this is a project that has had long study. This project has been under consideration, I would say, for a period of more than 20 years in Colorado. There is intense interest in this project, both in and out of the Federal Government.

Many years ago those in the Arkansas Valley who realized the need for additional water conceived this idea of bringing surplus water from the western slope to the eastern slope of Colorado. This bill authorizes the Fryingpan-Arkansas project as a culmination of those dreams of many years. Unfortunately, some of those who were first interested in this proposal have now passed on, so they will not live to see the fulfillment of their dreams. Many are still alive and are today working vigorously for this project.

I just want to say one further thing about this situation in Colorado.

Just 2 weeks ago I was in Colorado and I saw the effect of the prolonged drought in the Arkansas Valley. The Arkansas Valley, as you know, is one of the rich irrigated productive areas of our State, and I was amazed and shocked to see the situation which exists there today. Acres normally green with alfalfa at this time are now brown because of the lack of water. As a matter of fact, even in some of the dry-land districts the situation appears to be even better than in the rich irrigated districts. I was profoundly impressed with the present shortage of water in that area.

This project, as you know, provides supplemental water which, in many cases, will be the difference between a crop and no crop at all.

Mr. Chairman, I think that is all I care to say at this time. Thank you very much for this opportunity.

Mr. ENGLE. One question, Judge. Would you care to enlighten the committee as to the water condition at what I call Little Yucca Flats, otherwise known as Colorado Springs, the site of the Air Force Academy?

Mr. CHENOWETH. Yes. I think I will say to my distinguished colleague from California, the chairman of the full committee, that the situation is very well taken care of and the Air Academy will have a sufficient supply of water.

(Discussion off the record.)

Mr. ASPINALL. Back on the record.

If the chairman will yield. It is not necessary, Mr. Chenoweth, that the people of Colorado Springs receive any water from this particular project in order to firm up the water supply of the Air Academy?

Mr. CHENOWETH. That is correct, Mr. Chairman. They will receive some water under this project and are interested in the project, but exclusive of this project there will be plenty of water to take care of the Air Academy.

Thank you very much.

Mr. ENGLE. I thank the gentleman.

Mr. ASPINALL. This morning we shall listen to the departmental witnesses, and unless there is an objection, we shall have the statements presented and then question the witnesses as they sit together at the witness table.

Hearing no objection, it is so ordered.

We are glad to have with us again our former colleague, the Assistant Secretary, Fred Aandahl, who will give a statement for the Department.

STATEMENT OF HON. FRED G. AANDAHL, ASSISTANT SECRETARY OF THE INTERIOR

Mr. AANDAHL. Thank you, Mr. Chairman. I have a very brief statement I would like to read.

We appreciate the opportunity of appearing before your committee and expressing the views of the Department of the Interior and members of our staff who are concerned with the proposed Fryingpan-Arkansas project. On April 4, in accordance with your invitation, we sent a letter commenting in detail upon the project and the bill which is now under consideration. We recommended therein that the bill be enacted. Today I wish to reiterate and emphasize the recommendation, speaking for the Department of the Interior and for this administration as a whole.

Since our appearance last year before this committee on behalf of the Fryingpan-Arkansas project, a number of events have occurred which strengthen our convictions in its worthiness and justification. The various circumstances which have changed in the last year will be explained in detail by Commissioner Dexheimer and members of his staff, who are here with me today. The net effect of the last year's events has been to reduce the estimated cost of the project about 10 percent, to increase the anticipated revenues, and to shorten the repayment periods required by 10 years.

The basic purpose and major construction features of the project remain as they were in the original report, which was printed as House Document 187, 83d Congress. This plan has been endorsed by the President and this Department, and the other Federal agencies involved, the Governor of Colorado, and the water users, municipalities, and power interests in the Arkansas Valley. During the tenure of the previous administration, the project plan received similar bipartisan support.

Last summer President Eisenhower inspected the area with officials of the Departments of the Interior and Agriculture and was greatly impressed, so much so that he made special mention of the project in his message to the Congress on the budget. Should this project be authorized during this session of the Congress, we are prepared to send forward supplemental appropriation requests for funds to initiate construction immediately.

I am glad to renew my personal endorsement of the Fryingpan-Arkansas project and to have the opportunity of expressing the views of the administration.

Mr. ASPINALL. Thank you very much, Mr. Secretary.

We shall now have a statement from the Commissioner of Reclamation, Mr. Dexheimer.

STATEMENT OF W. A. DEXHEIMER, COMMISSIONER OF RECLAMATION

Mr. DEXHEIMER. Mr. Chairman, and distinguished members of this committee, it gives me great pleasure to appear here today to explain our plan for the Fryingpan-Arkansas project and to recommend enact-

ment of the legislation now under consideration to authorize its construction. With me today are Mr. G. E. Tomlinson, assistant chief, project development division, of my office; Mr. Emil Lindseth, assistant regional director at Denver; and Mr. Ben Powell, area engineer at Pueblo, who are prepared to give you the details of the plan, which I propose to outline briefly.

The Fryingpan-Arkansas project is designed to bring a sorely needed additional supply of water into the highly developed, but presently only partially productive, Arkansas River Valley in Colorado to alleviate existing annual water shortages on 322,000 acres of irrigated lands. The project will also provide more efficient and extensive uses of the existing water resources of the valley. Control of existing water and bringing in additional water will also remove problems of water supply which now restrict the expansion of various municipalities and industries in the basin. It will provide a new block of electric energy, for which a market is already assured, into this power-hungry area. Other benefits will accrue through flood control, improved fish and wildlife conditions, and recreational opportunities.

The major physical features of the plan remain the same as those we reported to this committee last year, but some changes are proposed in the municipal water supply facilities. Part of the project water supply will be derived from divertible flows of Hunter Creek and Fryingpan River, upstream tributaries of the Colorado River, which will be transported through a Continental Divide tunnel to the Arkansas River Basin. These increased importations and native waters of the Arkansas River will be regulated in storage reservoirs high on the eastern slope, then passed through a series of powerplants, and delivered to the lands and cities of the basin in accordance with water requirements. Construction of Aspen Dam and Reservoir on Roaring Fork River will permit the diversions to be made without adversely affecting water uses on the western slope and will improve fishery and recreational attractions of the Roarding Fork. Two existing reservoirs in the upper Arkansas River Basin would be enlarged to regulate not only the imported waters, but also Arkansas River flood flows and runoff during the winter months which are not now being used effectively.

By Mr. Aandahl's letter of April 4, the committee has been informed of a number of changes which have taken place since the Secretary reported on the Fryingpan-Arkansas project on April 30, 1953, and since House Document 187, 83d Congress, was printed. The city of Pueblo has made arrangements to build a water treatment plant to serve its needs and those of other entities in the valley, thereby eliminating that feature from the project plan. The city of Colorado Springs has provided adequate water for the Air Force Academy by other means, but, with the civilian population growth outstripping all estimates, it must look to the Fryingpan-Arkansas project for a greater amount of water than we had estimated would be needed.

In recognition of changes in construction costs since the previous estimates, the project costs were reestimated on the basis of prices prevailing in October 1954, which reflect a slightly lowering trend for heavy construction and other work. Allocations of cost were re-

vised in accordance with the new procedures agreed to by the Federal agencies concerned with water resources development, in order that such allocations prepared by any agency would be consistent in basic theory with those prepared by the others. The firm power rate was raised from 5.5 mills to 6.0 mills per kilowatt-hour, as being more representative of existing charges and to increase the project revenue. This rate is well below alternative costs of power in the area.

The boundaries of the assumed conservancy district were extended to include Colorado Springs. A reappraisal of the assessed valuation of property within the conservancy district boundaries from records of the State Tax Commission resulted in revenue forecasts substantially higher than previously estimated. I am happey to report that by these means the total estimated cost of the project has been reduced from $172,898,000 to $156,541,000. The repayment period for irrigation has been reduced from 69 years to 59 years, or 51 years after an 8-year construction period. Mr. Aandahl's letter rounds this repayment period to 60 years. We propose to execute with the overall conservancy district a single contract calling for the repayment of all of the reimbursable costs allocated to municipal water and irrigation other than the amount to be paid from surplus power revenues. The municipal water allocation will be repaid with interest and the irrigation allocation, in accord with reclamation law, will be repaid on an interest-free basis.

The amount to be repaid by the conservancy district will be derived from three sources: Sales by the district of irrigation water, sales by the district of municipal and industrial water, and tax collections by the district. By this arrangement the amounts to be repaid will assuredly be made on schedule. Representatives from the district, in discussions with the Bureau of Reclamation staff, suggested rates for municipal water and irrigation water as shown in the repayment analysis. The Bureau of Reclamation has checked these figures and found them to be sufficient to pay the project out as shown in the report. tially higher than previously estimated. I am happy to report that It is probable that in negotiating the final contract with the conservancy district there may be some changes in the details of the repayment, but a firm contract will be executed prior to start of construction.

There is no need for me to remind you that the West has been suffering through several low water years, and, in some areas, disastrous drought and dust. The Arkansas Valley cities, Pueblo and Colorado Springs particularly, have reached the limit of their present sources of supply, and water-use restrictions have been placed on the residents. With each passing year, these unhappy conditions become more acute. Largely through past increases in the requirements of the cities, irrigation in the valley has had to be reduced by about 80,000 acres from the peak of the 1920's. Unless the project is built, and quickly, the cities will be forced to condemn and purchase additional irrigation water rights, thereby retiring more valuable lands from production.

If the pending legislation is enacted, we are prepared to submit a request for a supplemental appropriation of funds for fiscal year 1956 which will permit beginning construction of Aspen Dam, the trans-Divide Tunnel, and Pueblo Reservoir. These features, which can be built quickly, are the key to early importation of western slope waters,

15,000 acre-feet of which need only eastern slope storage space as existing diversion facilities have adequate capacity to handle this water. The total construction schedule requires 13 years, but by proper scheduling of features to be built on an emergency construction schedule, some additional water could be brought into the basin and released at proper times to meet the most urgent needs within 2 years after start of construction, and a substantial part of the needs within 5 years after start of construction.

Officials of the State of Colorado, including representatives of the western slope water users, have agreed upon a set of operating principles to protect present and future water uses on both sides of the Continental Divide. These principles were set forth in our report and under this proposed legislation would become basic operating rules for the project. The project has attracted support from water users, municipalities, industries, power companies, the governor and various State agencies, the congressional delegation, and Federal officials of this and the preceding administration. President Eisenhower, after viewing the project area last summer, has endorsed it and made special mention in his budget message this year of its urgency. Practically the only opposition locally stems from a few persons living in or near the Aspen Reservoir area. Seldom do we find a project so universally and enthusiastically endorsed by the people most concerned.

Although this project was first conceived as the initial phase of a much larger diversion project, we have no intention of proposing the larger project. This unit is completely justifiable and feasible by itself. It represents the minimum practicable development. It is designed as a self-contained unit, and its authorization or construction would not imply a commitment for expansion, extension, or enlargement.

Assuming adequate appropriations and a normal construction schedule, revenues will begin to be received within 5 years. These revenues will be from water sales and the conservancy district tax levy. When construction is completed on the final power unit, 13 years after construction is started, 8 years of partial revenues will have been received. About 51 years after the last unit is completed, all reimbursable costs will have been returned to the Federal Treasury, with interest on the costs allocated to commercial power and municipal and industrial water. Under the proposed bill a variable annual repayment formula is provided which could result in shortening of the payout period, depending upon economic conditions during the last few years of payout. We have received assurance of the willingness of the water users to assume the project obligations; the cities are definitely supporting the project; and the power companies serving the area are ready and willing to absorb the surplus power output and to sign agreements for wheeling power to preference customers over their lines. The sponsoring organization has begun the formation of the conservancy district under State law. The large cities of Colorado Springs and Pueblo have passed ordinances which place around $200 million of property valuation in the district, in addition to the smaller towns and rural areas.

In every way, this project is ready and justified for construction at this time. Mr. Tomlinson, Mr. Lindseth, and Mr. Powell are here to give detailed information about the project.

Mr. ASPINALL. Mr. Dexheimer, do Messrs. Tomlinson, Lindseth, Powell, and Witmer have any statement of their own to make or do they desire to sit at the table?

Mr. TOMLINSON. I have a statement, Mr. Aspinall. I will be glad to read it or submit it for the record and highlight it, as you wish.

Mr. ASPINALL. The Chair will be glad to follow the wishes of the Secretary and the Commissioner and Mr. Tomlinson with respect to whether or not the statement should be read or whether it should be made a part of the record and referred to shortly by Mr. Tomlinson in an oral presentation.

Mr. DEXHEIMER. I think, Mr. Chairman, if we could have the statement put in the record, Mr. Tomlinson could highlight it and save some time for the committee.

Mr. ASPINALL. All right. Unless there is an objection, that will be the procedure.

Hearing none, it is so ordered and the statement will be made a part of the record.

(The statement referred to follows:)

STATEMENT OF GEORGE E. TOMLINSON, ASSISTANT CHIEF OF PROJECT DEVELOPMENT, BUREAU OF RECLAMATION

INTRODUCTION

The Fryingpan-Arkansas project is a potential multiple-purpose, self-contained water development located entirely within the State of Colorado. Surplus water from the Colorado River Basin will be diverted through the Continental Divide for beneficial and consumptive uses in the Arkansas River Basin on the eastern slope. Regulation of the native Arkansas River water plus the imported water will provide supplemental irrigation supplies, municipal water, and enable the generation of urgently needed hydroelectric power. Benefits will also accrue from flood control, sediment control, recreation, and fish and wildlife. Provision is also made for replacement of water on the western slope.

PLAN OF DEVELOPMENT

The plan of development involves the following principal features:

(*a*) A system of about 50 miles of canals and tunnels on the western slope for the collection and movement of water from Hunter Creek and tributaries of the Fryingpan River; (*b*) Aspen Reservoir, with an active capacity of 28,000 acre-feet near the town of Aspen on the western slope, to provide replacement water and water for future western slope uses; (*c*) the 6-mile Fryingpan-Arkansas transmountain diversion tunnel; (*d*) enlargement of the existing Sugar Loaf and Twin Lake Reservoirs and the construction of Pueblo Reservoir for a total eastern slope storage capacity of 777,000 acre-feet; (*e*) facilities for diverting Arkansas River flows; (*f*) a project power system comprising 60 miles of canals, 7 powerplants having an installed capacity of 104,800 kilowatts, 7 switchyards, 6 substations, and necessary transmission lines; and (*g*) facilities for furnishing additional municipal water to Colorado Springs, Manzanola, Rocky Ford, La Junta, Las Animas, Lamar, Crowley, Wiley, and Eads. Construction of the specific municipal delivery systems by the United States would be undertaken only after it is proved that construction by the communities themselves is infeasible.

The general plan of development, including the basic 1950 planning report, is contained in House Document No. 187, 83d Congress, 1st session, printed in June 1953. That document also contains the report by the Secretary of the Interior, dated April 30, 1953, which revised the original cost estimates as well as the economic and financial analyses.

Since the Senate and House hearings of June 1953, the plan of development has been critically reexamined. I am happy to report that no major changes in the basic plan have been deemed necessary or advisable. We have brought the water supply studies up-to-date and we have consulted with many local

people and communities concerning their needs and desires for water and power. These conferences resulted in some changes for municipal water features. For example, the city of Colorado Springs has requested more municipal water than was originally contemplated which necessitated a change in the point of delivery. As another example, the city of Pueblo is constructing a new water treatment plant which will have sufficient capacity to treat water for the valley municipalities if desired. This has eliminated the need for certain works in the project plan of development. We have also prepared a new financial and economic analysis using current construction costs, a new method of cost allocation to conform to an agreement between interested Federal agencies, and refined statistics concerning the tax yield of the potential conservancy district. However, the basic project plan is the same today as it was when our first report was released in 1948, although the plan appears to be even sounder from a financial standpoint.

Water collected in the western slope diversion area would flow through the Fryingpan-Arkansas Tunnel to begin a series of useful stair-step descents. The water would first be regulated in the enlarged Sugar Loaf Reservoir located on Lake Fork of the Arkansas River. Except for fish flows and some irrigation bypasses, the imported water plus native supplies would flow in the Elbert power canal and through the Elbert powerplant into the enlarged Twin Lakes Reservoir for reregulation. In addition to the imported Lake Fork water, this reservoir will also regulate Lake Creek inflows, Arkansas River flows picked up by the Snowden Diversion Canal, and transmountain importations from the system of the Twin Lakes Co.

After necessary fish flow releases to the Arkansas River, the water from Twin Lakes would be released into the Twin Lakes-Otero Canal and through the Otero powerplant into the existing Clear Creek Reservoir which would be modified slightly to serve as an afterbay. From Clear Creek Reservoir, the Otero-Wapaco Canal would transport the water to the Wapaco powerplant. The Wapaco diversion canal would pick up accretions from the Arkansas River at that point. The enhanced water supply would flow in the Wapaco-Princeton Canal to the Princeton powerplant. After interception of some of the Chalk Creek flows the water would then be transported in the Princeton-Pancho Canal, through the Pancho powerplant, thence in the Pancho-Salida Canal, through the Salida powerplant, and into the Arkansas River.

The project water would then flow down the Arkansas River to Canon City where municipal supplies for Colorado Springs would be diverted and pumped into a pipe line. The remaining project water would enter Pueblo Reservoir for reregulation along with certain flood flows and winter water.

The Bessemer ditch would divert its water from a separate headgate at the Pueblo Dam. All other water would be released through dam outlets or through the Pueblo powerplant into the River. Municipal supplies for Pueblo and the valley towns would be diverted from the river below the dam. All other water would continue down the river for subsequent diversion or storage by privately owned facilities.

The project will be operated best to utilize and to conserve all water supplies. Water will be held in the upper high altitude Sugar Loaf and Twin Lakes Reservoirs to the fullest extent practicable in order to minimize evaporation and to enhance winter power generation. Interconnection of the powerplants will facilitate integrated operation and enable the downstream Pueblo powerplant partially to complement the upstream powerplants during the irrigation season.

The project will make available an annual average supply of about 185,000 acre-feet of supplemental irrigation water at canal headgates in the Arkansas Valley. This water, which includes estimated reuse of return flows, will be obtained from several sources. It includes transmountain importations by the project, capture of flood flows, winter flows and return flows from project water.

NEED FOR PROJECT

All of the irrigation water to be conserved and regulated by the project would be available to the 322,000 acres of irrigated lands in the Colorado portion of the main stem Arkansas Valley. These lands now experience an average annual shortage of irrigation water estimated at 35 percent of headgate diversion requirements. The base flow of every stream in the valley is overappropriated. With the additional project water supplies, the headgate shortages could be entirely eliminated in 17 years out of 34, and the average annual shortage would

be reduced to about 16 percent. The only source of new water is the Colorado Basin. Much of the irrigated area is adjacent to range and dry-farmed lands which pose a new dust bowl threat. These lands were hard hit in the 1930's many of them were blown out in 1954, and the Department of Agriculture fears even worse conditions should drought and high winds continue. The supplemental irrigation water supply provided by the Fryingpan-Arkansas project would provide new job opportunities and feed for livestock, to offset partially the effects of the drouth in adjacent areas.

Present municipal water supplies are inadequate for continued population and industrial growth. The municipal supplies of many Arkansas Valley towns are poor because of excessive hardness. The project will provide about 20,500 acre-feet of municipal water annually to supplement the supplies of Colorado Springs, Pueblo, and at least eight smaller communities in the Arkansas Valley where additional quantity and better quality water is urgently needed.

The imported and regulated water would generate an average of about 505,000,000 kilowatt-hours of electric energy annually. There is a ready and ever-growing market for this energy. It is needed to meet increasing requirements for electric energy on farms and in cities and for mining and industrial expansion.

Flood protection would be provided by the terminal eastern-slope Pueblo Reservoir which would eliminate about 66 percent of the probable annual flood damages in the valley between Pueblo and the John Martin Reservoir.

Pueblo Reservoir would capture much of the sediment now carried by that stream. This would greatly alleviate the troublesome and expensive silting problem now experienced by water users diverting from the river.

The project would maintain flows in the natural streams sufficient to preserve existing fishery and recreational values and in some cases would prevent further depletion of these values by the present water users. The Twin Lakes Reservoir and Canal Co. which diverts water from the headwaters of the Roaring Fork River is currently planning to increase greatly their existing diversions from the Roaring Fork under their decreed water rights. The present diversion seriously affects fishing in the Roaring Fork River above Aspen, Colo. The Fryingpan-Arkansas project would provide water for the Twin Lakes Co. in lieu of its increased diversion and thereby protect and improve the fishery values of the Roaring Fork River.

The present plan for the Fryingpan-Arkansas project is the culmination of many years of effort by residents of the Arkansas Valley. The need for supplemental irrigation and municipal water was demonstrated in the 1920's. Various private plans for the importation of water were started, some were actually developed, but no overall plan was devised because of the numerous complex problems involved. The severe drought of the 1930's demonstrated the vulnerability of the Arkansas Valley and the urgent need for action. In 1936, the Bureau of Reclamation initiated a comprehensive survey of the upper Arkansas River Basin to appraise needs and possible methods of alleviation. Early studies envisioned the importation of a relatively large quantity of Colorado River water into the upper Arkansas Basin. However, an inventory of resources, needs, and potential uses of water on the western slope had not then been made. Consequently, it was deemed necessary to develop a self-contained plan which would divert only a minimum amount of critically needed water that was assuredly beyond the requirements of the western slope and yet have a project that could fit into a much larger development should such expansion ever come to pass. The present plan is the result.

The project has been designed to obtain maximum values for each dollar of investment. This has been accomplished by designing features for multiple uses and planning for coordinated and intergrated operations. The interrelationship of operations is demonstrated by the need for interconnection of the hydroelectric plants. These plant interconnections will enable the operation of reservoirs in such a manner as to insure maximum generation consistent with optimum water supply for irrigation. Interconnections with adjacent power systems will also provide an uninterrupted flow of energy to the power markets.

In the event that construction of any of the municipal water delivery facilities should be deferred, the water can be used for irrigation. The other phases of the project—irrigation, power, flood control, sediment control—are so closely tied together in features and operation that elimination of all or parts of any one function would have a profound effect upon the others. This project is a true multiple-purpose development.

STATE APPROVAL OF PROJECT

Prior to completion of the final project planning report by the Bureau of Reclamation, a policy and review committee was created in November 1948 by the Colorado Water Conservation Board to study the proposed project plan. The committee was composed of representatives of the conservation board, the Colorado Game and Fish Commission, western Colorado, the Arkansas Valley, and the city of Colorado Springs.

Initial recommendations by the policy and review committee pertaining to principles which should be used in operating the project were incorporated in the final Project Planning Report of 1950. The recommendations of the committee were revised and approved by the Colorado Water Conservation Board on February 22, 1951. Portions of the committee's report as revised and approved by the board, which were omitted from the 1950 planning report, are contained in the official comments by the State of Colorado, page 157 of House Document 187. Thus, all of the recommendations and discussions that were approved by the Colorado Water Conservation Board are a part of the planning report by reference. The Governor's letter, the planning report, and other documents made it clear that the Fryingpan-Arkansas project is a self-contained unit and its construction would not imply a commitment for developing future water supplies in the Gunnison River Basin for diversion to the Arkansas River Basin. Both eastern and western slopes were represented on the policy and review committee and on the Colorado Water Conservation Board. Both of these agencies approved the plan of development.

The 1950 planning report was officially reviewed by the States in the Colorado River Basin, by Kansas, and by affected Federal agencies. Colorado approved the proposed development conditioned upon compliance with the operating principles mentioned above and upon changing the name to the Fryingpan-Arkansas project. In commenting on the planning report, the States of Kansas, Arizona, California, Utah, and Wyoming had no objection to the authorization and construction of the project. Views and comments of the various Federal agencies were generally favorable.

WATER SUPPLY

The State of Colorado has been allotted a consumptive use of more than 3.8 million acre-feet of water annually from the Colorado River and its tributaries. Out of this allotment Colorado is now consuming approximately 1.5 million acre-feet annually by all constructed projects, those authorized, and projects under construction. Thus, there remains for future use in Colorado about 2.3 million acre-feet per annum. The proposed Fryingpan-Arkansas project would utilize 75,000 acre-feet or about 3 percent of Colorado's remaining allotment. There is also before this committee H. R. 270 for the authorization of the "Colorado River storage project and participating projects." Colorado's participation in H. R. 270 would amount to about 400,000 acre-feet of consumptive use annually. Should both of these proposals be authorized, there would still remain for further developments in Colorado approximately one-half of Colorado's allotted water from the Colorado River system.

COSTS AND BENEFITS

The estimated construction cost of the project has been adjusted several times in the last few years, primarily to reflect current price levels. The total construction costs shown in the 1950 planning report were $147,440,000, based upon prices prevailing in October 1949. That cost was revised upward to $172,898,000, using January 1953 prices for Secretary McKay's report of April 30, 1953. The current estimated construction cost is $156,541,000 which reflects October 1954 prices and also includes some engineering refinements of the plan. The annual operation, maintenance, and replacement costs of all features and facilities are estimated at $1,391,000. That sum includes a specific expense of $452,000 annually for the municipal water pipelines and related facilities which, in actual operation, would be borne directly by the concerned communities or by the conservancy district.

For purposes of benefit-cost comparison a 100-year period of analysis is used. It is well within the useful life of the major project works. The three high-altitude reservoirs will not be subject to impairment by sediment deposition. Pueblo Reservoir will have sufficient storage capacity for sediment for a 100-year period. Therefore, the active storage capacity for irrigation and flood con-

trol would not be encroached upon until after 100 years. Other project features will be adequately maintained.

To allow for the economic costs of the project in the benefit-cost analysis, interest on Federal funds during the construction period is calculated to be $5,615,000. Addition of this sum to the construction cost of $156,541,000 brings the total public investment in the project to $162,156,000. Conversion of the last figure to an annual equivalent basis for the 100-year period at 2.5 percent interest amounts to an annual cost of $4,429,000.

Other annual costs in the economic analysis include the total operation, maintenance, and replacement costs of $1,391,000; an allowance of $503,000 for taxes foregone associated with the power development, and an annual cost for regulation provided by the upper Colorado River storage project of $163,000 (69,200 acre-feet at $2.35). The total annual economic cost of the project, therefore, is $6,486,000.

Irrigation benefits will stem from supplemental water supplies, conservation and use of flood flows, reregulation, and more timely use of water now used for winter irrigation, and reuse of return flows from both irrigation and municipal water supplies. Annual irrigation benefits have been evaluated in 2 categories—direct benefits in the form of increased net farm income amounting to $1,569,000 annually, and indirect benefits in the form of increased income stemming from the marketing and processing of farm commodities and from increased purchases by the irrigation farmers. These indirect benefits are estimated at $2,707,000 annually. The irrigation benefits are based upon a prospective index of 215 for agricultural prices. These irrigation benefits are 1.8 percent less than those shown in the project report. This reduction was made to take into account the slight reduction in water available for irrigation use due to the expansion of the supply for municipal use.

Municipal water supply benefits total $1,304,000 annually and are derived from analysis of the costs of developing and operating an alternative single-purpose municipal water supply system. The cities of Colorado Springs and Pueblo, because of existing and scheduled military and industrial installations, are expecting a substantial increase in the population and the number of business establishments in their general areas. The Fryingpan-Arkansas project will assure an adequate supply of municipal water for their expanding needs.

Annual power benefits of $3,207,000 represent the value of project power in the area to be served. These benefits were derived through cooperative analysis with the regional office of the Federal Power Commission in Forth Worth, Tex. The alternative value of power in the area to be served by the project is based upon costs of a combination of private and local public facilities that would most likely obtain to provide an equivalent power supply in the absence of the project.

Flood-control benefits in the reach of the Arkansas River between Pueblo and John Martin Reservoir were evaluated by the Corps of Engineers and total $598,000 annually on the basis of prospective future prices.

Fish and wildlife benefits have not been evaluated in an annual amount. However, the Game and Fish Commission of the State of Colorado and the Fish and Wildlife Service concurred in the conclusion that incremental costs of western slope features are supportable for the mitigation of present losses occurring from diversions of water by existing farmer-owned irrigation systems.

Annual sediment retention benefits of $141,000 are of relatively small magnitude. They represent savings of annual costs of cleaning and maintaining existing canals and diversion works due to less sediment deposition and the prolongation of the useful life of existing downstream reservoirs.

The total of all evaluated annual benefits is $9,526,000—$6,819,000 of direct benefits and $2,707,000 indirect irrigation benefits. The ratio of total annual project benefits to costs is 1.47 to 1. It is significant that the sum of the direct benefits alone is sufficient to support all project costs in the ratio of 1.05 to 1.

It is coincidental that these ratios are essentially the same as the benefit-cost ratios reported in House Document 187. For the present analysis, procedures have been used in conformance with some revisions in standards, particularly as provided by the recent interagency agreement on cost allocation policy.

COST ALLOCATION

The total estimated project construction costs have been allocated to all functions served except sediment control. The allocation to fish and wildlife is limited to the separable costs of $1,898,000 for features on the western slope that will mitigate losses. Allocations to the remaining purposes have been made

by the separable costs-remaining benefits method which has been adopted by interagency agreement. This method of allocation, a refinement of the alternative justifiable expenditure method used in House Document 187, is the method agreed upon by all of the major Federal agencies involved in the construction of multiple-purpose projects. In the separable costs-remaining benefits method, separable costs for each of the project purposes are used instead of specific costs. Separable costs include both the specific costs and incremental costs of joint features incurred by the inclusion of a function in the multiple-purpose project.

The allocation of construction costs is as follows:

Function	*Allocation*
Irrigation	$67,653,000
Power	44,551,000
Municipal water supply	8,200,000
Municipal water delivery system	16,328,000
Total reimbursable	136,732,000
Flood control	17,911,000
Fish and wildlife	1,898,000
Total nonreimbursable	19,809,000
Total construction cost	156,541,000

REVENUES

The plan of project operation calls for the formation of a water conservancy district under provisions of Colorado law which would contract with the Government for the payment of project services performed in the collection, storage, regulation, and release of water. Supplemental irrigation water and water for municipal and industrial uses would be released to the district at reservoir outlets or possibly along the river, depending upon circumstances. The conservancy district would be responsible for the delivery of all irrigation water and possibly for municipal water, depending upon contractual arrangement.

The 1950 report proposed a rate of $3.60 per acre-foot for irrigation water at or above the Pueblo Reservoir. That rate was within the payment capacity of the water users on the basis of agricultural prices prevailing during the 1939–44 period, when the agricultural price index averaged 144. As first proposed 2 years ago, the contract with the conservancy district should contain provisions for varying annual irrigation water charges in accordance with agricultural prices. The assumption that future agricultural price index will average 215, rather than 144, results in upward adjustment of the basic rate for irrigation water to $5.40 an acre-foot.

The estimated total project construction cost includes the cost of municipal water pipelines to cities' limits and related facilities. However, such construction would be undertaken only if the communities demonstrate their inability to complete such financing themselves. Payments on the construction costs of the municipal delivery systems and associated operation, maintenance, and replacement expenses, as well as that portion of the importation and storage works allocated to municipal water would necessitate a total average charge of about $52.40 per acre-foot for municipal water. Details of this are shown in the table on revenues.

The project will also have other sources of revenue as follows: proceeds from an ad valorem tax levied by the conservancy district on taxable property benefited by the project, service charges for the storage of additional water in project reservoirs for the Twin Lakes Co. and for the Colorado Fuel & Iron Corp., and service charges for the reregulation of water supplies presently used for winter irrigation.

Tentative boundaries for the conservancy district have been delineated. A statistical analysis has been made to determine the current assessed valuation, the probable increase of that valuation, and the probable tax yield of the area within the proposed boundaries. The total assessed valuation of the 9 counties in the district area exceeded $414 million for 1954. The assessed value of the proposed district area within those 9 counties has been computed to be $355 million. That valuation would yield a net revenue of $320,000 annually after deduction of 10 percent for operating expenses. It is estimated that the valua-

tion and the tax yield will increase gradually over the years. In order to accomplish project repayment, the net tax yield of the conservancy district will be applied toward amortization of the interest-free irrigation investment and a portion will be applied toward repayment of the municipal water supply investment which bears interest at the rate of 2½ percent. It is not proposed that any portion of the conservancy district tax would be applied against the construction costs of the municipal delivery systems. Estimated annual project revenues are summarized as follows:

Revenues—Function and source of revenue

	Annual amount
Irrigation and district:	
Project water (51,200 acre-feet at $5.40)	$276,500
Twin Lakes service (12,500 acre-feet at $3)	37,500
Regulation of winter water (74,00 acre-feet at $2.25)	166,500
District tax (average over repayment period)[1]	446,700
Subtotal	927,200
Less operation, maintenance, and repair	88,000
Net irrigation revenues (rounded)	839,200
Power:	
370,000,000 kilowatt-hours at 6 mills	2,220,000
97,200,000 kilowatt-hours at 3.5 mills	340,200
Subtotal	2,560,200
Less operation, maintenance, and repair	840,000
Net power revenues (rounded)	1,720,200
Municipal and industrial water supply:	
Municipal supplies (20,500 acre-feet at $5.40)	111,000
Storage of C. F. & I. water (4,000 acre-feet at $2)	8,000
Portion of district tax[1] applied to repayment of municipal water supply	162,000
Subtotal	281,000
Less operation, maintenance, and repair	11,000
Net municipal water revenues (for supply)	270,000
Municipal and industrial water delivery system:	
Delivery of water to Colorado Springs (10,000 acre-feet at $52.50)	525,000
Delivery of water to valley towns (7,500 acre-feet at $68.27)	512,000
Subtotal	1,037,000
Less operation, maintenance, and repair	452,000
Net municipal water revenue (for delivery system)	585,000
Total average annual net project revenue	3,414,400

[1] The district tax would be realized from an ad valorem tax of 1 mill levied by the conservancy district on taxable property within the district boundaries. The 1954 assessed value of property within the contemplated district was $355 million. It has been estimated that the average annual increase in assessed valuation would equal 2 percent of the 1954 evaluation. An average of $35,000 per year has been allowed for district expense.

PAYOUT ANALYSIS

The project will be operated in conformance with the laws of the State of Colorado. Although some of the details of actual operation are contingent upon contractual negotiations, the general planned procedure is as follows. The Government will negotiate an overall repayment contract with the conservancy district. The Government will probably operate the basic water supply works and the power system. Irrigation water, and possibly municipal water, will be delivered to the district at reservoir outlets or at specified points in the river. The district will assume responsibility for the apportionment and delivery of water to the headgates of water users organizations and municipalities. The

water users organizations are principally mutual farmer-owned, farmer-operated ditch companies.

I have been advised informally that a conservancy district can readily be organized at the appropriate time. As evidence of this the two largest communities in the district area have indicated their willingness to participate. The city of Pueblo consented to inclusion in the district by approval of city ordinance No. 2073, dated September 13, 1954. The city of Colorado Springs passed an enabling ordinance on February 23, 1955, which now has been formally adopted.

The current analysis of the project presents a repayment procedure based on the following standards: (*a*) Interest during construction is added as a cost to the allocations of both power and municipal water. (*b*) An interest rate of 2½ percent is used in the amortization of the power and municipal water investments. (*c*) None of the interest is applied toward the repayment of irrigation costs. (*d*) Revenue from the sale of water and power and other services under temporary contract would be available during the construction period for operation and maintenance, replacement reserve, and the retirement of capital costs. On the above basis, the power investment could be retired in the 39th year following completion of construction. The investment allocated to municipal and industrial water supply could be repaid in the 50th year following completion of construction, and the investment in municipal water pipelines could be liquidated or repaid in 50 years following the completion of those facilities. The irrigation investment would be retired in 51 years following the completion of construction from revenues paid by the irrigation beneficiaries during the entire repayment period and from the application of net power revenues after power payout in the 39th year. Actually, completion of repayment of irrigation costs is accomplished by use of only a part of the irrigation revenues, district tax proceeds and power revenues accruing in the 51st year following completion of construction. By the end of that year a revenue surplus of $1,216,000 accumulates after payment of the irrigation investment of approximately $1,836,000 remaining at the beginning of the 51st year. After retirement of investments, the continuing annual net power revenues would accrue to the United States Treasury throughout the remaining useful life of the project works.

CONCLUSIONS

The Fryingpan-Arkansas project is feasible from an engineering standpoint; it is economically justified by a favorable benefit-cost ratio; it is financially feasible because the reimbursable costs can be fully repaid within a period far less than the useful lives of the principal works. The repayment analysis has been prepared in accordance with standards specified by the Secretary of the Interior. The construction costs have been allocated by procedures approved for interagency use. The project has been officially approved by the State of Colorado and its construction has been endorsed by the President of the United States. The project will strengthen the economic sinews of the State of Colorado and will indirectly benefit the entire Nation. This project is a wise investment of public funds and should be constructed as soon as possible.

Mr. ASPINALL. At this time, Mr. Tomlinson, the committee will be glad to have a short oral presentation of the matters contained within the statement.

STATEMENT OF GEORGE E. TOMLINSON, ASSISTANT CHIEF OF PROJECT DEVELOPMENT, BUREAU OF RECLAMATION, DEPARTMENT OF THE INTERIOR

Mr. TOMLINSON. I think it would be very helpful, Mr. Chairman, if I went to the map and pointed out just what the project is and what it will do.

Mr. ASPINALL. That will be agreeable, and identify the map for the record, please.

Mr. TOMLINSON. This is a map showing the southern part of Colorado, with Denver on the north, the New Mexico line on the south, Utah on the west, and Kansas on the east.

The project is a multipurpose project——

Mr. ASPINALL. May the Chair first call attention to the fact that the map does not show many and varied small tributaries which feed from the top of the Continental Divide into the tributaries as shown on the map. There are dozens and scores of little creeks which are affected by this project. I think Mr. Tomlinson will agree with that statement.

Mr. TOMLINSON. That is right, sir.

Starting in the headwaters, the project will build some collection works, about 50 or 60 miles of canals and tunnels over on the western slope, tapping those tributaries, some of those tributaries which Mr. Aspinall just mentioned, and diverting them through a tunnel a little less than 6 miles. I believe it is 5.2 miles long. It will divert them into the upper reaches of the Arkansas Basin and into Sugar Loaf Reservoir.

In order to make good and observe the water rights over in the Colorado River Basin, there has been worked out an agreement between the eastern interests and the western interests in the State as a whole. A replacement reservoir at the Aspen site would hold about 28,000 acre-feet and would serve to make good not only the present water rights but also the estimated needs for water in the future which could be served by this particular stream, which might otherwise be adversely affected by the diversion of Colorado water into the Arkansas Basin.

The Sugar Loaf Reservoir is presently a private-owned reservoir of about 17,000 acre-feet capacity. The plans of the project are to enlarge that reservoir considerably up to 117,000 acre-feet. Water would be stored at this high altitude where evaporation is relatively low and where it can be held to be released under the most optimum schedule later on.

Depending on the need for irrigation, power and other purposes, water will be released out of the Sugar Loaf Reservoir through a canal into the Elbert powerplant. The Elbert powerplant has about a 515-foot head, I believe, and it would have an installed capacity of around 8,700 kilowatts.

The water then would flow into Twin Lakes. Twin Lakes is a privately owned reservoir in existence today in the capacity of around 56,000 acre-feet. The project would increase that capacity to about 260,000 acre-feet to provide additional high elevation storage where the water could be kept with the minimum evaporation loss for reregulation and use for the many project purposes later.

Out of Twin Lakes as in all of these releases—I will not mention it each time—there will be proper bypasses to the river to take care of the requirements and for the existing rights.

From Twin Lakes it would flow through a canal down to the Otero powerplant. That has about 287 feet head, with a capacity of around 19,200 kilowatts.

Then it would go to the Wapaco powerplant with almost 500 feet head, and installed capacity of around 16,500 kilowatts.

Then it would flow through a little longer canal down to the Princeton powerplant, where the water would again be passed through a 278-foot plant, having installed capacity of around 11,700 kilowatts. Then through the Pancho powerplant, where again it would be put through a 268-foot head powerplant, with a capacity of around

15,000 kilowatts. From there it would flow through another canal to the Salida powerplant, which would have about 405-foot head and an installed capacity of around 22,700 kilowatts.

Then the water would be released into the river where it would flow past Canon City and into the proposed Pueblo Reservior.

The Pueblo Reservoir would be a 400,000 acre-foot reservoir and have about 120 feet of power head and installed capacity of around 11,000 kilowatts.

The total installed capacity of those 7 powerplants would be a little over 100,000 kilowatts.

There would be 7 switchyards and 6 substations involved. The power canals would total in length around 60 miles.

I might add—I can discuss it later if you wish—that while this is high elevation country, I personally went over the area about 3 weeks ago and walked or rode over practically all of the center line of that canal route, and that it is not so-called canyon country, it is not rough and rugged terrain. I have some statistics that I can give you on just how flat the country is.

Mr. ASPINALL. Just so the committee will know, you rode over the canal route on the eastern part of the divide?

Mr. TOMLINSON. Right.

Mr. ASPINALL. You did not ride over the canal route on the western part?

Mr. TOMLINSON. That is right, Mr. Aspinall. I am glad you supplemented my remarks there. The western slope was closed because the pass going through there was closed. I did not go over the divide, but I did go over the Sugar Loaf area and all the way down, as a matter of fact, to the State line.

I might add that I was in the midst of a very unusual dust storm, in the lower part of the valley and at a slow speed of 10 miles per hour we practically had an automobile accident just because we could not see ahead.

The water, after it is released from the Salida powerplant, as I said, would flow back into the Arkansas River. Then a diversion would be made at or near Canon City to deliver through a conduit of about 50 miles in length the municipal water supply which would be furnished to Colorado Springs. The rest of the water would flow into the Pueblo Reservoir, would be released out of the reservoir, and would be picked up at the Pueblo treatment works. A year ago, when we were discussing this project, the treatment plant was considered a project cost, although it was provided, as you know, that the treatment works would not be built unless it was to be shown that the city could not build that and the other part of the distribution system. So Pueblo has started construction already of the treatment works, and we have taken out of the estimates and out of the plans as a project features the treatment works which last year we had in.

The water then would be pumped through the treatment works at Pueblo. Pueblo would, of course, get its supply there, and then the valley cities downstream from Pueblo below would get their water after making the proper arrangements with Pueblo for treating the water for them, by pumping out from the Pueblo treatment works up into the municipal water lines to serve cities such as LaJunta, Hunter, Las Animas, Lamar, and a side conduit up to Eads. That is the way the municipalities would get their water.

In discussing the Pueblo Reservoir, I might add that is a very key structure. We have studied and restudied that in considerable degree. You remember some of our friends, in fact, the Department of Agriculture, suggested that we look further into the idea of developing the project in two separate phases, (1) the imported water, and (2) the reregulation of the natural Arkansas water. Theoretically that could be done. However, the only practical site for a large reservoir in this stretch where it would be effective, satisfactory, is at the Pueblo site, and unfortunately the main line of a railroad runs right down that valley. So if we build a reservoir there at all, we are going to have to move that railroad, and it is going to cost almost as much to move the railroad for a small reservoir as it would for the large reservoir. And if we built a single-purpose irrigation reservoir to reregulate winter flows and what-have-you, we not only would have greater evaporation in this lower altitude reservoir, but we also would have a considerable more expense than one function alone, such as irrigation, could stand. By building a multiple-purpose reservoir we can properly allocate to, and serve the purposes of, several functions such as power, flood control, irrigation and so forth. By that means we were able to arrive at a reservoir capacity at the Pueblo site for irrigation purposes which would be feasible. Any other plan would not be feasible.

That reservoir is estimated—I can give you the exact figure—at about $40 million on today's costs. You would save some if you built a little smaller one, but it would not be reduced commensurate with the reduction in capacity.

So that is one of the principal reasons why we just could not work out a project using the native waters alone. The water users themselves have developed all of this irrigation on their own initiative and, generally speaking, with private capital. They have just about come to the end of the road insofar as being able to develop, by the conventional private-enterprise type of developments, all the water that can be developed.

I might go through the analysis of revenues, which is in the latter part of my statement. If you wish to follow me, it is on page 18.

We plan to sell—and these are average year revenues—51,200 acre-feet of project water at $5.40 per acre-foot. There are people here from the irrigation areas who will testify as to the worth of the water and to their willingness to pay that.

We plan to reregulate the water at Twin Lakes. As I mentioned before, Twin Lakes is a privately owned reservoir. It will be increased in size. We plan to negotiate a contract with the Twin Lakes people to handle 12,500 acre-feet annually for them at $3 an acre-foot.

We plan to regulate winter water and to sell that regulation to the tune of about 74,000 acre-feet a year at $2.25 per acre-foot. Those are figures which we think will be realized and can be realized, and there are local people here who can talk on the value of that.

I might add, in regard to this winter water regulation, a point which is not in my formal statement. That is, by holding the water which irrigators have rights to for use in the wintertime, holding it in project reservoirs, and then releasing it through the powerplants for irrigation purposes when they really need it more in the spring and fall, they will avoid winter irrigation. And, as you know, putting water on the lands during the wintertime accelerates freezing and

thawing which causes the ground to swell up and more or less disintegrate or get powdery, which encourage blowing. I think there is a very real benefit that would come out of keeping the water off in the wintertime and diminishing to the extent possible this extra freezing and thawing of the topsoil, and thereby adding what we can to relieve this dustbowl situation.

Another item is the district tax. A general area of some nine counties will be included in the overall conservancy district. The two largest of those counties, Pueblo County, around Pueblo, and El Paso County, which contains Colorado Springs, have already passed ordinances which would put them very definitely into the conservancy district. These two counties alone will produce about two-thirds of the assessed evaluation and, consequently, about two-thirds of the conservancy tax revenues. So I do not think there is much question but what the conservancy district can be organized quickly and eagerly following authorization of this project.

There are also people from those communities who will be glad to speak to that, if you have any questions on that.

We charged $446,000 a year of the district tax to the repayment of the irrigation allocation. That gives a total irrigation revenue, after you take off the operation, maintenance, and replacement costs of about $88,000, of $839,200.

On power, we have, as has been stated previously, a generation of around 500 million kilowatt-hours of energy a year. After we deduct 7 percent for transmission and delivery losses, we come up with about 470 million kilowatt-hours. Of that, 370 million kilowatt-hours is firm energy, and we estimate that can be sold at 6 mills per kilowatt-hour. The going interim rate of the Bureau of Reclamation power system in the area at the moment is something more than 6 mills. The upper Colorado rate, just across the divide in the same general area, would be 6 mills. That is an increase from the year ago estimate of 5½ mills. That has been looked into pretty carefully. We are confident that is a conservative figure. Since that time the cost of energy for steam power, that is, either coal or gas, has gone up considerably, and we have worked with the Federal Power Commission Fort Worth office in establishing a power value which is more than this, and we do not anticipate any difficulty at all in selling that power at that price.

There are almost 100 million kilowatt-hours of secondary power which we estimate will be sold at about 3½ mills. That gives total power revenues of around $2½ million per year, which, after subtracting the operation, maintenance, and replacement costs of $840,000 a year, leaves net power revenues of roughly $1,720,000 a year.

On municipal water, it is estimated that the project would sell 20,500 acre-feet at $5.40, for a total revenue of $111,000 per year.

Storage of C. F. and I. water in Sugar Loaf Reservoir—and there we would be merely handling the water for them in the reservoir which they built—at $2 an acre-foot would yield $8,000 a year.

And as I mentioned before, a portion of the district tax, about 27 percent of the total district tax, or $162,000 a year gives a total revenue for the supply features of the municipal and industrial water of $281,000, less operation, maintenance, and replacement of about $11,000 a year, gives net municipal water revenues for supply of $270,000 per year.

There is an extra cost which has to be added to municipal and industrial water. So far these costs which I have just mentioned merely

deliver the water at the project reservoirs. The water would have to then be delivered to the cities which would use the water. In some cases it might be a rather long line, such as in the case of Colorado Springs which has a line which is nearly 50 miles in length, or the valley towns, which would have a much longer line than that, but, of course, there would be a number of municipalities sharing in the costs and services of that line.

It is estimated that the delivery system—maybe we have not used good terms here, but we use "delivery system" to mean from the river or reservoir to the city limits. It is not the internal city distribution system but the delivery system merely gets it to a wholesale point either at or near the city limits.

It is estimated that the Colorado Springs conduit would cost, on the basis of 10,000 acre-feet a year, about $52.50 per acre-foot per year to amortize that conduit and the pumping plants and other features attached to it.

The delivery of the water to the valley towns, 7,500 acre-feet per year to those towns in the lower area, would cost around $68.27 per acre-foot. You add those revenues together and you get $1,037,000 per year gross revenues which, after you subtract out the operation, maintenance, and replacement costs, of $452,000 per year, leaves a net municipal water revenue of around $585,000 per year.

That gives a total average annual net project revenue of around $3,400,000 a year.

I have a tabulation, Mr. Chairman, which I would like to offer to the committee members at this time to show the details of the changes in the plan from what we had when we were here a year ago.

Mr. ASPINALL. Without objection, the statement showing the changes from the former bill to the present bill will be made a part of the record at this point.

Hearing no objection, it is so ordered.

(The document referred to follows:)

Comparison of changes, Fryingpan-Arkansas project

	H. Doc. 187 [1]	December 1954 [2]	Remarks
Construction costs:			
Total project costs	[3] $172,898,000	$156,541,000	
Basic project features	151,398,000	140,213,000	
			Changes due mainly to—
Replacement Reservoir, Aspen.	8,102,000	7,636,000	Price decline.
Sugarloaf Reservoir enlargement.	7,248,000	6,723,000	Do.
Twin Lakes Reservoir enlargement.	10,222,000	9,543,000	Do.
Salida afterbay	310,000	302,000	Do.
Pueblo Reservoir	43,453,000	41,418,000	Do.
Hunter Creek-Aspen Canal	288,000	266,000	Do.
Hunter Creek-extension canal	409,000	642,000	Refinement of estimate.
South side collection system	9,263,000	9,430,000	Refinement of design.
North side collection system	21,126,000	15,897,000	Refinement of design and price decline.
Fryingpan-Arkansas divide tunnel.	10,111,000	8,801,000	Refinement of design.
Snowden canal	792,000	731,000	Price decline.
Power canals	12,929,000	11,792,000	Do.
Powerplants	14,917,000	15,552,000	Price increase.
Switchyards	3,885,000	4,390,000	Do.
Transmission lines	5,079,000	4,836,000	Price decline.
Substations	2,091,000	1,233,000	Deletion of Colorado Springs substation.
General property	1,173,000	961,000	$112,000 included under municipal water system, balance price decline.

See footnotes at end of table.

Comparison of changes, Fryingpan-Arkansas project—Continued

	H. Doc. 187 [1]	December 1954 [2]	Remarks
Construction costs—Continued			
Municipal water delivery system	$21,500,000	$16,328,000	
Main purification plant	7,148,000		Feature deleted.
Pueblo pumping plant	1,470,000		Do.
Colorado Springs pumping plant.	155,000		Do.
Oil Creek Brush Hollow Canal.	361,000		Do.
Pueblo water conduit	1,735,000		Do.
Arkansas Valley water conduit.	10,631,000	8,332,000	Change due to reduced head and length.
Arkansas Valley pumping plants.		192,000	Feature added.
General service equipment		53,000	Do.
Colorado Springs features:			
Gorge diversion dam		81,000	Do.
Canon City pumping plant.		561,000	Do.
Sand Creek pumping plant.		520,000	Do.
Water supply conduit		6,483,000	Do.
Transmission line and service equipment.		106,000	Do.
Allocation of construction costs [4]	[5] 172,898,000	156,541,000	
Irrigation	75,128,000	67,653,000	In accordance with interagency cost-allocation policy, the separable costs—remaining benefits method has been used for the December 1954 allocation.
Municipal water:			
Delivery system	21,500,000	16,328,000	
Basic project costs	11,154,000	8,200,000	
Power	41,945,000	44,551,000	
Flood control	20,341,000	17,911,000	
Fish and wildlife	2,830,000	1,898,000	
Benefit-cost analysis:			
Public investment	[6] 179,492,000	162,156,000	
Construction costs	172,898,000	156,541,000	
Interest during construction	6,594,000	5,615,000	
Annual costs	6,378,000	6,486,000	
Equivalent of public investment.	4,902,000	4,429,000	
Operation, maintenance, and replacement.	1,313,000	1,391,000	
Regulation by upper Colorado storage project.	163,000	163,000	
Taxes foregone (power system).		503,000	In accordance with interagency cost allocation policy.
Annual benefits	9,458,000	9,526,000	
Irrigation	4,355,000	4,276,000	Irrigation benefits reduced due to greater use of water for municipal purposes.
Direct	1,598,000	1,569,000	
Indirect	2,757,000	2,707,000	
Municipal water	1,662,000	1,304,000	Reduction due to revised and lower cost alternatives.
Power	2,702,000	3,207,000	Increase due to evaluation of benefits in accordance with interagency policy.
Flood control	598,000	598,000	
Sediment control	141,000	141,000	
Total direct benefits only	(6,701,000)	(6,819,000)	
Benefit-cost ratios:			
Direct benefits only	1.05:1.00	1.05:1.00	
Total benefits	1.48:1.00	1.47:1.00	
Average annual net revenues	[7] 3,190,600	3,414,400	
Power	1,504,400	1,720,200	Firm energy rates increased from 5.5 to 6 mills per kilowatt-hour.
Irrigation	622,000	839,200	
Project water	306,000	276,500	Reduction in quantity of water from 56,700 acre-feet to 51,200 acre-feet.
Twin Lakes service	37,500	37,500	
Regulation of winter water	166,500	166,500	
District tax	179,000	446,700	Increased tax due to reanalysis of assessed values, inclusion of El Paso County, and allowance for future growth.
Operation, maintenance, and replacement costs.	−67,000	−88,000	

See footnotes at end of table.

Comparison of changes, Fryingpan-Arkansas project—Continued

	H. Doc. 187 [1]	December 1954 [2]	Remarks
Benefit cost ratios—Continued			
Municipal water	$1,064,200	$855,000	
Water supply	433,000	270,000	H. Doc. 187 shows details of revenues from water sales and services on p. 118, table 12. In December 1954 analysis revenues for water supply including sale of 20,500 acre-feet at $5.40 and a fixed portion of Conservancy district tax.
Water sales	437,200	111,000	
Storage of Colorado Fuel & Iron water.	8,000	8,000	
Portion of district tax		162,000	
Operation, maintenance, and replacement costs.	−12,200	−11,000	
Pipelines to city limits	631,200	585,000	
Gross revenues	1,039,200	1,037,000	
Operation, maintenance, and replacement costs.	−408,000	−452,000	
Repayment of reimbursable costs:			
Power investment:			
Interest rate—percent	[3] 2.5	2.5	
Years required:			
Construction period	9	8	Reduced period due to increase in firm energy rate from 5.5 to 6 mills per kilowatt-hour.
After construction period	44	39	
Irrigation investment:			
Years required	69	59	Reduction due to lesser allocation and greater conservancy district tax revenues. No segregation made of years during and after construction in H. Doc. 187.
Construction period		8	
After construction period		51	
Municipal water investment:			
Interest rate—percent	2.5	2.5	Construction period of 8 years does not apply to repayment of costs of municipal water delivery system in December 1954 analysis. It applies to payment of water supply costs only.
Years required:			
Construction period	13	8	
After construction period	50	50	
Payout summary:			
Total construction cost	[4] $172,898,000	$156,541,000	Payout summary excludes surplus of revenues of $1,216,256 at end of 51st year after completion of construction.
Repayable interest during construction.	2,484,000	2,026,000	
Total investment	175,382,000	158,567,000	
Less nonreimbursable costs:			
Flood control	20,341,000	17,911,000	
Fish and wildlife	2,830,000	1,898,000	
Balance reimbursable	152,211,000	138,758,000	
Power investment	43,275,000	46,035,000	
Net power revenues	76,408,308	76,385,638	
Interest	(33,133,308)	(30,350,638)	
Irrigation investment	75,128,000	67,653,000	
Irrigation water users	35,190,000	27,717,100	
District tax	12,351,000	24,640,755	
Power revenues	25,472,000	20,297,145	
Municipal water revenues	6,738,000		
Less operation, maintenance, and replacement.	4,623,000	5,002,000	
Municipal water investment	33,808,000	25,070,000	
District tax		9,319,645	
Municipal water users	88,788,837	6,716,000	
Payment of pipelines to city limits.		51,692,061	
Interest	(28,508,237)	(10,443,706)	
Less operation, maintenance, and replacement.	26,472,600	23,214,000	
Total investment repaid	152,211,000	138,758,000	

[1] Price index date: January 1953.
[2] Price index date: October 1954.
[3] From table II, p. 6.
[4] Exclusive of interest during construction assigned to power and municipal water.
[5] From table III, p. 7.
[6] From table I, p. 5.
[7] From table V, follows p. 8.
[8] From table V, follows p. 8.
[9] From table V, follows p. 8.

Mr. TOMLINSON. I thought, if you wanted to look down those two tables at this stage, I would be glad to answer any questions.

I might say, generally, the $16 million reduction in costs came about through: (1) the elimination of the treatment plant at Pueblo as a project cost; (2) general price declines in work not involving a great amount of hand labor, such as earth canals and earth dams and things of that nature; and (3) a refinement in the physical plan of certain of the individual features. That last was not so great, but it did in some small items cause some changes.

You will notice that the cost has come down $16 million. On page 2 of this statement you will notice where we have added, under municipal water delivery system, the cost of supplying the Colorado Springs features, which is a little over $7 million, which would have to be brought about by diverting the water at Canon City for Colorado Springs instead of working out an exchange agreement which was contemplated a year and 2 years ago.

You will find that this new cost estimate results in corresponding changes in the cost allocation. You recall that the Army engineers in commenting on our report stated that we should use a method of cost allocation which is agreed upon by all the agencies. At that time such a method had not yet been evolved, however. Since then we have got together and the Interior, the Army, the Federal Power Commission, and have formally proposed and adopted a method of cost allocation. As far as I know, all of the Federal agencies have gone along with that method. It is called the separable costs-remaining benefits method. Applying that method of allocation to the new construction costs, you get the allocations to irrigation, municipal water, power, flood control, and fish and wildlife shown in this tabulation.

We also made a new economic analysis showing, as contrasted with the financial analysis, the economic costs, and there again we used the methods worked out in this interagency agreement. And while there were a lot of ups and downs in adjustments, the fact remains that even though we had a $16 million reduction in cost, the benefit-cost ratio came out just about the same as before. I might add that they were favorable in both cases.

One other point: You will notice that the payout now under the present presentation will show that power will pay out in 39 years. This compares with the usual 50-year repayment. It is true that we could have spread power out over 50 years and lessened the load or added some component for aiding irrigation, but we elected to pay it out in 39 years and thereafter use, during the remaining 11 or 12 years of the payout period, the net revenues to aid irrigation, which is usually done in reclamation projects. You might say there is approximately half a mill in the power rate which is used as a component to aid irrigation.

That may be oversimplified, but it is not far from being an absolute fact.

The municipal water will all be repaid in 50 years at 2½ percent interest.

The irrigation will be paid out in 51 years after the last 8 years of construction. We had hoped to get that down to 50 years, but actually the figures show 50 years and 7 months. So we did not change them.

We thought we would let the chips fall where they would and just present them the way the tables came out. That is a substantial reduction over the figures we presented last year.

I just have these two points I would like to make, and then I will be glad to answer any questions which you might want to bring up.

There is a 13-year construction period envisioned, but after about 5 years we would have the Aspen reservoir built, we would have the tunnel through the divide, and we would have the Pueblo Reservoir completed to the point where it could be storing water. Some of those features I mentioned would take less than 5 years, but in the 5 years we would have all that and more. So the area would begin to get considerable relief from their present water shortage. So we used the 5 years as a point when some benefits would start accruing in real measurable terms.

Then it would take 8 years additional while we were finishing up the powerplant and finishing up some of the other features before the whole project was finished, and during that period the revenues would increase until at the end of the 13 years they would be about on a normal. As you see, this payout is practically 50 years, although it runs slightly over, following the completion of construction.

I have one other point which I would like to show. We have several charts here. There is one chart here entitled "Seasonal Irrigation Requirements and Effective Supply." If I am not mistaken, that appears in House Document 187, so you will have a copy permanently for your reference, if you wish.

Mr. ASPINALL. Identify the chart.

Mr. TOMLINSON. The chart shows by years 1911 through 1953, the average adjusted historical water supply, which on the average is 2.1 acre-feet per acre. It also shows the average supply per year with the Fryingpan-Arkansas project completed, which would be about 2.7 acre-feet, and the average ideal requirement, if you could get in water from any source you wished regardless of costs and availability, of 3.19 acre-feet per acre.

You will notice that this chart shows, that in some years you have an average supply—not an adequate supply, but you have a supply that would be up to the average—and some years you have quite a deficiency. The historical supply, which is shown in blue, is what has been the average. Some years you had sufficient rain and coolness where you did not need quite as much water as other years, and so that is why in some years, such as 1915, if this should be repeated, you would not need but a very little amount of project water to get them up to what they need because of natural conditions.

On the other hand, some other year such as, say, 1934, just to pick one at random, you had very small amount of natural water supply from the regular sources, and the project would supply a goodly portion. But you would still have had a considerable amount that particular year. You would have needed almost 5 feet of water to raise the crops, whereas in some year like 1915 you would not need but a little over 2 feet of man-applied water. So the project water would supply the areas shown in red. Some years, as you see, you would use very little; in others you would use much.

The witnesses from the irrigation interests here today will testify that the $5.40, if it were applied against all the water they use, would be way more than they could pay, but it is insurance water, coming at

the time when it would spell the difference between a good crop or a bad crop or even no crop, and that is well worth the $5.40.

They can also show you where some irrigation organizations have already developed on their own supplemental supplies for small amounts, I will admit, but which on an acre-foot basis, which costs them on a present-day cost index basis almost exactly the same amount per acre-foot that this project water would cost them.

One example that I know is the Fort Lyon Canal. The others I am sure would speak the same story.

Mr. ASPINALL. Does that complete your statement?

Mr. TOMLINSON. Those are all the comments I have unless you have some questions.

Mr. ASPINALL. You will be seated at the table and will be joined by Mr. Lindseth, assistant regional director, Denver, Colo.; Mr. Powell, area engineer, Pueblo, Colo.; and Mr. Witmer, of the Office of the Solicitor of the Department.

QUESTION PERIOD OF ASSISTANT SECRETARY OF THE INTERIOR FRED G. AANDAHL; COMMISSIONER OF RECLAMATION W. A. DEXHEIMER; GEORGE E. TOMLINSON, ASSISTANT CHIEF, PROJECT DEVELOPMENT DIVISION; EMIL V. LINDSETH, ASSISTANT REGIONAL DIRECTOR, DENVER, COLO.; B. F. POWELL, AREA ENGINEER, PUEBLO, COLO.; AND T. R. WITMER, OFFICE OF THE SOLICITOR, DEPARTMENT OF THE INTERIOR

Mr. ASPINALL. Mr. Tomlinson, just to get a little clearer picture in our minds from the map, would you go to the map and point out where the existing Twin Lakes diversion facility is located?

Mr. TOMLINSON. It is on Lake Creek, Mr. Aspinall. I cannot point it out too well here. It is shown in blue right at this particular point here [indicating]. I take it that is Roaring Fork River itself. Is that right, Mr. Powell?

Mr. POWELL. Yes.

Mr. TOMLINSON. Roaring Fork over to Lake Creek, being a tributary of the Arkansas.

Mr. ASPINALL. That is the headwaters?

Mr. TOMLINSON. The headwaters of both streams; yes, sir.

Mr. ASPINALL. How will the proposed Fryingpan-Arkansas correlate its facilities with the existing Twin Lakes diversion?

Mr. TOMLINSON. The Twin Lakes has a diversion right now measured in second-feet. I may oversimplify a little bit but, as I understand, they are presently diverting some 37,000 or 38,000 acre-feet per annum.

Mr. ASPINALL. What is the total right?

Mr. TOMLINSON. They have decreed rights for what amounts to around fifty-two thousand and a fraction acre-feet per year. As you understand, the rights are all expressed in second-feet, and we are interested primarily in this project in acre-feet. They are not at present diverting their entire 52,500 acre-feet of decreed rights. The tunnel is sufficiently large to permit that diversion, but the Twin Lakes Reservoir and other needed storages and reregulating facilities are not adequate.

We have received word formally from them that they intend to increase their facilities to handle their full decreed rights as soon as they can, and will do it on their own if the project does not go ahead.

There is one thing the project will do in regard to that, though. If they take the additional 15,000 acre-feet out of the Roaring Fork River, they will create quite an adverse condition for fish and wildlife conservation. The condition is not too good there at the moment. There are conflicting stories on that. When I was out in the field the people I talked with claimed that the fishing already was practically ruined because of the diversion of low flows which they are making now.

So one of the project features is to make diversions through the project system in lieu of some of the diversions which the Twin Lakes people otherwise would make.

Mr. ASPINALL. You mean also through the project tunnel?

Mr. TOMLINSON. Through the project tunnel, yes, sir. And thereby eliminating the necessity for the Twin Lakes to divert all of their decreed rights at that point, thereby helping tremendously the fishing interests below the Twin Lakes present diversion.

Mr. ASPINALL. If the total diversion of the existing Twin Lakes private project and the Fryingpan-Arkansas project take place, what will be the total acre-feet diversion from western Colorado to eastern Colorado from that particular area?

Mr. TOMLINSON. I would like to answer that in two parts, sir. I am not too sure about Twin Lakes. My understanding is around 52,000 acre-feet or less. If that is the case, they would be diverting somewhere between 45,000 and 50,000 acre-feet per year. The project itself will divert approximately 69,200 acre-feet on the average. Now that diversion will vary from year to year, depending upon the availability of the water and the situation respecting the storage of the water on the other side, and all that. But if I remember correctly, the minimum diversion will be around 25,000 acre-feet and the maximum diversion around 113,000 acre-feet per year.

Mr. ASPINALL. Of both projects?

Mr. TOMLINSON. That is just the reclamation project, to which you would have to add the figure of the Twin Lakes, which I think is slightly under 50,000.

Mr. ASPINALL. My next question—and I am just trying to orient here.

Mr. TOMLINSON. I appreciate your bringing out this other because I think it is very important and maybe I should have highlighted it.

Mr. ASPINALL. Where will the tunnel as proposed by the Fryingpan-Arkansas project be located as related to the existing Twin Lakes diversion?

Mr. TOMLINSON. It would be located north. I do not know how many miles north. I would say 25 miles north. And it would collect a number of these tributaries of the Fryingpan and of Hunter Creek and the Hunter Creek extension, and divert at that point.

Mrs. FROST. Would my chairman yield?

Mr. ASPINALL. Certainly.

Mrs. FROST. I would like to ask if this diversion takes some of the water that belongs to the Twin Lakes?

Mr. TOMLINSON. Yes and no. We would work this out by agreement with the Twin Lakes people. There will be no conflict there,

I am sure. We would take 3,000 acre-feet of water from the project collection area and give it to Twin Lakes which would then, by contract, agree not to divert that amount of low flow water of their existing decreed rights. In addition, the project would store, on a service charge basis, 12,500 acre-feet of water which they are not diverting because they do not now have storage facilities to handle it. I do not know if I answered your question or not. I would be glad to clarify if I could.

Mrs. PFOST. The question I was trying to put is whether or not by virtue of placing this tunnel up above the Twin Lakes you would be taking water away from Twin Lakes.

Mr. TOMLINSON. No. In fact, our plan is to increase the Twin Lakes Reservoir from 56,000 acre-feet up to 260,000 acre-feet. We are going to supply a tremendously larger quantity than the 3,000 acre-feet we would ask them not to divert.

Mr. ASPINALL. One other question at this place. You show the irrigated lands on the eastern slope of Colorado in green on the map to which you referred; do you not?

Mr. TOMLINSON. Yes, sir.

Mr. ASPINALL. Will you point out to the committee just what lands there are that will be benefited by this project?

Mr. TOMLINSON. I will be glad to do that, sir. The lands which could be benefited are the valley lands shown in green—and I will point—here in this area in here. We have made a study of those lands. They total about 322,000 acres of lands presently irrigated. There are about 169,000 acres of that land which we classify as group or class I, which is the very best. There are about 140,000 acres which we classify as group II or class II, which is the second best, and there are about 13,000 acres which we would classify nonirrigable. But the fact remains it is a private development. They have the land. It is probably in smaller areas here, there, and everywhere [indicating]. So you will see figures appearing in the report of sometimes 322,000 and sometimes 309,000. My own guess is that even though we declare those 13,000 acres nonirrigable under our standards, the fact they are so interspersed among the others means they will probably continue to get water under existing decreed rights, and the farmer will find it cheaper to put water on them than to dike them off or not to supply them. It is a very small amount.

I know the point was raised once before as to why we had the two figures, and that is the explanation.

Mr. SISK (presiding). The Chair will recognize the gentlewoman from Idaho. Do you have any questions?

Mrs. PFOST. Mr. Chairman, I should like to ask Mr. Dexheimer what is the length of the tunnel?

Mr. DEXHEIMER. The main tunnel will be 5.2 miles through the divide.

Mrs. PFOST. And the canals will be somethinig like 45 miles in length then?

Mr. DEXHEIMER. You mean the collection system?

Mrs. PFOST. Yes, in addition to the 5-mile tunnel?

Mr. DEXHEIMER. On the west side, Mrs. Pfost?

Mrs. PFOST. Whatever it requires to divert the water over onto the eastern slope.

Mr. DEXHEIMER. There would be about 55 to 60 miles of collection canals and tunnels on the western slope leading to the 5.2-mile tunnel, and then there will be other tunnels and canals on the east slope, of course, leading into the reservoir and the powerplants.

Mrs. PFOST. How many miles of tunnel and how many miles of canals will it require on the east slope?

Mr. DEXHEIMER. There would be, I think, only a very few, if any, short tunnels on the east slope, perhaps not over a few hundred feet, where you came to a very steep cliff or something, and there would be about 60 miles of canals on the east slope.

Mrs. PFOST. Mr. Dexheimer, in your statement, on page 2, you say:

> Construction of Aspen Dam and Reservoir or Roaring Fork River will permit the diversions to be made without adversely affecting water uses on the western slope.

Does the western slope object to this diversion?

Mr. DEXHEIMER. No. I think you will find that there will be some witnesses to testify on that. As I pointed out later in my statement, the only objection we have had has been from a few residents of the Aspen area itself. Those people are largely rather wealthy people who have recently established summer homes up there, and they would like to keep those areas in their natural state, or at least that is their claim. They are not recognizing, however, the great need for water in other areas. This Aspen Reservoir, we think, would actually increase the recreational values of the general area and certainly would add to the fishing values.

Mrs. PFOST. Will you be increasing the capacity of the Aspen Reservoir by this project?

Mr. CHENOWETH. That is a new project.

Mr. DEXHEIMER. There is no Aspen Reservoir in this location on the Roaring Fork River. We would build a new reservoir.

Mrs. PFOST. Then this new reservoir will flood out some valuable summer homes? Is that the objection being raised by the western slope people?

Mr. DEXHEIMER. No; I do not believe this will mean any flooding out of homes or other things. It is just an interference with the wild area, as I understand it.

Mr. ASPINALL. If my colleague will yield there——

Mrs. PFOST. Yes.

Mr. ASPINALL. It will flood out Assistant Secretary of the Navy for Air Smith's home, and it will flood out Mr. Dixon's home. There is no question about that. It will put water over the homes to the height of 70 or 80 feet.

Mr. DEXHEIMER. Thank you for the correction. I had forgotten there were two homes in the area that would be flooded, but it does not flood the general area of Aspen.

Mrs. PFOST. Are these homes located on farms and do they have valuable irrigated lands at the present time? Or are they grazing lands or just merely summer homes?

Mr. DEXHEIMER. I think largely, as I understand it, summer homes for those people, but they do have some grazing and pasture, but no irrigated agriculture other than pasture lands.

Mrs. PFOST. Then what are these other objections, these people you referred to a moment ago who want to keep it in its natural state? How will this infringe upon the natural state?

Mr. DEXHEIMER. I think, Mrs. Pfost, I could probably best represent that by showing the committee this map of Colorado and the Forest Service areas that are available in Colorado.

Mr. ASPINALL. If my colleague will yield.

Mrs. PFOST. Yes.

Mr. ASPINALL. I want the committee to understand this perfectly. As far as any objections to this from very many people in Colorado as far as hurting any native natural condition, there is very little. The objection raised by these people up there goes to the fact that it is going to ruin their ranges to a certain extent, it is going to shorten them on the use of water. It is not a question like you have in the Echo Park area. Let us keep that in mind.

Mrs. PFOST. Thank you.

Mr. DEXHEIMER. I think it is merely an objection by very few people that some of their range, as Mr. Aspinall points out, would be destroyed. But——

Mrs. PFOST. By being flooded?

Mr. DEXHEIMER. Those 2 houses and 2 areas are the only ones that would be involved.

Mr. ASPINALL. If my colleague would yield again. Mr. Dexheimer, the objections from most of the people come from users of the water and users of the stream for recreation and fishing. Is that not true?

Mr. DEXHEIMER. Yes, sir; I think that is correct.

Mr. ASPINALL. Not because of any flooding, but because of the taking away of water.

Mrs. PFOST. Reducing the flow of the streams?

Mr. ASPINALL. That is right.

Mr. DEXHEIMER. And, of course, our diversion of flow would be during the floods when the fishing and recreation would be at a minimum and during the winter.

This general map of Colorado shows in color. The green is the national forest. The purple is the national parks and monuments, and the yellow is the Indian reservations. In addition, of course, there are lots of other public lands. This small dot here is the Aspen Reservoir. So you can see that it is a very minor amount we might be encroaching in that general area either as to range or fishing or water supply, so minute as really not to cause objections by either the people on the western slope, the users of the Colorado River waters, or in any other way except to these very few people whose personal property might be harmed by the reservoir.

Mrs. PFOST. How much water, Mr. Commissioner, will you actually store and divert?

Mr. DEXHEIMER. We propose to divert about 69,000 acre-feet on the average per annum. That will depend on the runoff available and the water supply on the east slope, and so on, and, as Mr. Tomlinson points out, this would vary.

Mrs. PFOST. How will this affect the upper Colorado River project that is being considered by this committee, the diverting of an extra 69,000 acre-feet of water?

Mr. DEXHEIMER. I think that can best be answered by Mr. Northcutt Ely's testimony before the committee, I think, 2 years ago, in which he said this was such a very smtll amount of water as to be negligible so far as its effect on the Colorado River system.

Mrs. PFOST. I also note on page 2 of your testimony, Mr. Dexheimer, that the city of Pueblo has now made arrangements to build a water-treatment plant to serve its needs and those of other entities in the valley. Where do they get their supply of water?

Mr. DEXHEIMER. They presently get most of their supply from the Arkansas River. They would enlarge the supply that they take from that river. They have also been planning, and their proposal is, that they would build the treatment facilities to supply other cities and towns in the valley rather than have us build it. Who will build the pipeline has not been firmly established as yet, and it is provided that we might built it in the bill.

Mrs. PFOST. In other words, the treatment plant is being put in by the city of Pueblo and there is a sufficient flow of water in the river to take care of their domestic needs at the present time?

Mr. DEXHEIMER. There has been up to the present moment. However, they have been restricted during the past two summers on the use of water because of an insufficient supply, and they need additional water to meet their growing demands.

Mr. CHENOWETH. Will my colleague yield?

Mrs. PFOST. Yes.

Mr. CHENOWETH. I think the record should show, Mr. Dexheimer, that Pueblo has had to purchase some water recently. I think we will have testimony as to the purchase of a large amount of water in order to meet present needs.

Mrs. PFOST. Where would they buy this water?

Mr. DEXHEIMER. As I pointed out in my statement here, there have been since the 1920's approximately 80,000 acres of irrigated land taken out of production because the cities have bought their water rights and they utilized their water. And without some additional supply in the valley, that would have to continue in order for them to get their supply.

Mrs. PFOST. Where does the city of Colorado Springs get their additional water for the Air Force Academy?

Mr. DEXHEIMER. Generally they have established water rights that they are developing in the vicinity of Pike's Peak and some of the tributary streams in that area.

Mrs. PFOST. In other words, you contend that this area has actually utilized all of the water that is available and the only means of additional water is by diverting from the Colorado River?

Mr. DEXHEIMER. With the exception, Mrs. Pfost, that there are certain flood flows now uncontrolled.

Mrs. PFOST. Certain what?

Mr. DEXHEIMER. Flood flows uncontrolled that they are utilizing probably not to the best advantage. As Mr. Tomlinson pointed out, they are irrigating during wintertime, and some of that water runs off, of course, and by building these storage projects the water could be saved and utilized to much better advantage in the irrigation season. But even with that savings and better use of water that is available in the stream which this project would provide, they still need the importation of additional water to meet their needs.

Mrs. PFOST. Mr. Commissioner, can you assure the people on the western slope that you will be taking water only during flood stage or at a time when the river is high so that you will not be depriving them of water that they will need for irrigation purposes?

Mr. DEXHEIMER. Yes, that is provided in the plan and the operating criteria that are set up in the legislation provides for that. So we are required to protect their interest on the western slope.

Mrs. PFOST. In what months are you going to use this water for storage?

Mr. DEXHEIMER. We only divert it during the flood season, as I pointed out, and generally at that altitude it is May, June, and July when the snows are melting. It would be diverted during that period of time.

Mrs. PFOST. Then the bill guarantees there would be no water taken during these other months when the western slope is using the water?

Mr. DEXHEIMER. I think the bill before you, H. R. 412, section 3, provides that the operation shall be as set forth on pages 20 and 23 of Senate Document 106 of the 82d Congress, and that spells out the operating criteria for this project, which does assure to the western slope their water supply will not be detrimentally affected.

Mrs. PFOST. Mr. Chairman, I think that is all I will ask now, but I should like to reserve some additional time.

Mr. ASPINALL. The lady may have that permission.

Mr. Dexheimer, you do not mean to say that there is going to be practical diversion from the gathering canals to the lake at the tunnel mouth during the month of May, do you?

Mr. DEXHEIMER. That there would be diversion?

Mr. ASPINALL. Yes.

Mr. DEXHEIMER. I think there would be some, Mr. Aspinall, depending, of course, upon the season and the runoff.

Mr. ASPINALL. Of course, if I know anything about the country, there is not very much runoff at that time of the year at that altitude.

The Chair recognizes the gentleman from California, Mr. Hosmer.

Mr. HOSMER. Mr. Chairman, thank you.

In connection with these canals on the west side, would they be empty and would the transmountain diversion tunnel be empty except only during about 3 months of the year?

Mr. DEXHEIMER. I think generally the answer is "yes." You realize that in the wintertime at that high altitude the canals would be filled with snow and ice and it would be so cold that little water could be run through them. In the flood season, when the snow is melting, and so on, we would divert water through the collecting system and into the tunnels on the east slope. At periods of low flow later on after the snow melt is gone, then they would probably relatively be empty.

Mr. HOSMER. Would you recite again the annual amount of water that is proposed to be diverted?

Mr. DEXHEIMER. The average annual amount is about 69,000 acre-feet.

Mr. HOSMER. And what is the total amount of water that is proposed to be supplied by this project?

Mr. DEXHEIMER. With regulating the waters of the east slope and diverting 69,000 average from the west slope, the total would be in the neighborhood of 185,000 acre-feet additional water which would be available in the valley per year.

Mr. HOSMER. Where does this water come out of the transmountain tunnel? Just review that again.

Mr. TOMLINSON. The tunnel is less than 6 miles long and comes out at Sugar Loaf Reservoir [indicating] right here.

Mr. HOSMER. It goes into Sugar Loaf Reservoir.

Mr. ASPINALL. Will my colleague yield there?

Mr. HOSMER. Yes.

Mr. ASPINALL. What is the altitude of that tunnel?

Mr. TOMLINSON. I would have to get the exact figure, but about 10,000 feet elevation.

Mr. ASPINALL. Thank you, Mr. Hosmer.

Mr. HOSMER. 10,000 on one end and about 9,800 on the other, is it not?

Mr. TOMLINSON. Something on that order.

Mr. HOSMER. Then it goes into the Sugar Loaf Reservoir?

Mr. TOMLINSON. Yes, sir.

Mr. HOSMER. And is there a powerhouse right at the reservoir?

Mr. TOMLINSON. Not at Sugar Loaf. There is a powerhouse at Elbert just before it goes into Twin Lakes.

Mr. HOSMER. How does it get from Sugar Loaf to Elbert?

Mr. TOMLINSON. It gets there through an open canal.

Mr. HOSMER. How long is that canal?

Mr. TOMLINSON. About 20 miles.

Mr. HOSMER. What is the altitude at Elbert?

Mr. TOMLINSON. About 9,800 feet.

Mr. HOSMER. Roughly about 100 feet from the top?

Mr. TOMLINSON. Yes, sir. The Elbert powerplant itself has a head of around 500 feet, maybe just a little more.

Mr. HOSMER. And are you familiar with the Big Thompson project?

Mr. TOMLINSON. Yes, I am. Are you asking me?

Mr. HOSMER. Either one may answer, you or Mr. Dexheimer.

Mr. DEXHEIMER. Yes.

Mr. HOSMER. You are?

Mr. DEXHEIMER. Yes.

Mr. HOSMER. You have had some trouble up there with the open canals at high altitudes, have you not?

Mr. DEXHEIMER. Not that I know of, no.

Mr. HOSMER. Not from freezing?

Mr. DEXHEIMER. No particular difficulty so far as diversions after we learned a little about the operation and how it was to be managed.

Mr. HOSMER. What were those difficulties you had prior to this knowledge you acquired?

Mr. DEXHEIMER. As I recall, some operating problem with ice collecting at the intake of the tunnel, which was taken care of by special means that now do not give us any difficulty.

Mr. HOSMER. Difficulty from freezing?

Mr. DEXHEIMER. Yes, sir.

Mr. HOSMER. And at what altitudes were these difficulties incurred?

Mr. DEXHEIMER. That intake is approximately 8,500 feet above sea level.

Mr. HOSMER. And here we are at approximately 9,800 feet.

Mr. DEXHEIMER. Yes, sir.

Mr. HOSMER. And we have some 20 miles of canal.

Mr. DEXHEIMER. Correct.

Mr. HOSMER. Was or was not it necessary in some instances to change your designs on the Big Thompson to covered transportation of this water rather than canals?

Mr. DEXHEIMER. No, we have no covered canals there.

Mr. HOSMER. Is not this Elbert powerplant supposed to function 12 months of the year?

Mr. DEXHEIMER. No, sir.

Mr. HOSMER. When is it supposed to function? How much of the year does it function?

Mr. TOMLINSON. Three to 4 months.

Mr. HOSMER. Which months would it function?

Mr. DEXHEIMER. That would be generally at the same time we are diverting water from the west slope during the melting season of the snow and ice.

Mr. HOSMER. Then you are going to have a powerplant there that is not used but about a fourth of the year?

Mr. TOMLINSON. Something of that order, sir.

Mr. HOSMER. How about the Otero powerplant?

Mr. TOMLINSON. That will be used off and on throughout the year.

Mr. HOSMER. Off and on?

Mr. TOMLINSON. Yes, sir.

Mr. HOSMER. What do you mean by that?

Mr. TOMLINSON. The releases will be made there to serve the needs for the three purposes.

Mr. HOSMER. My question was directed to what you mean in relation to time.

Mr. TOMLINSON. If it will be operated during the wintertime. I think that is what you asked me about. Yes, sir.

Mr. HOSMER. Would it be operated during the springtime?

Mr. TOMLINSON. Yes, sir.

Mr. HOSMER. Would it be operated during the summertime?

Mr. TOMLINSON. Yes.

Mr. HOSMER. Would it be operated during the fall?

Mr. TOMLINSON. Off and on all around the year. Like any hydro system it is put on for peaking and so would not necessarily be going——

Mr. HOSMER. It is only a peaking powerplant?

Mr. TOMLINSON. No, sir, it is not. It is a hydroelectric plant, and all hydroplants are operated, of course, to serve the loads as best they can.

Mr. HOSMER. I want to get around to "off and on." Do you mean it would operate sometime during the day, or not during the day, some time of every day during the year, some weeks, some months, or——

Mr. TOMLINSON. As a general answer it would be operated continually, although I do not want to imply it would never be shut down.

Mr. HOSMER. What is the capacity of Otero?

Mr. TOMLINSON. Around 20,000, 19,200 kilowatts.

Mr. HOSMER. And what is the capacity at Elbert?

Mr. TOMLINSON. Elbert is 8,700 kilowatts.

Mr. HOSMER. Have you got enough storage in Twin Lakes Reservoir to operate Otero, as you say, "off and on," despite the fact that you are not getting any supply down there from Sugar Loaf?

Mr. TOMLINSON. Yes, sir.

Mr. HOSMER. What is the capacity of the Twin Lakes Reservoir?

Mr. TOMLINSON. 260,000 acre-feet.

Mr. HOSMER. And what is the route of your water from Twin Lakes Reservoir to Otero? How does it get there?

Mr. TOMLINSON. Through canals?

Mr. HOSMER. What is the altitude?

Mr. POWELL. 9,200.

Mr. HOSMER. How long is the canal?

Mr. POWELL. Six miles.

Mr. HOSMER. And what precaution are you taking against freezing interrupting the supply to Otero?

Mr. POWELL. None are necessary.

Mr. HOSMER. At 9,200 feet?

Mr. POWELL. None are necessary. It comes out at Twin Lakes Reservoir at such a temperature it would not freeze in that length of canal.

Mr. HOSMER. What is the difference in climate between the east slope at 10,000 and the west slope at 9,700 that makes it impossible for you to flow water in your canals only about 3 months of the year on the western slope and permits you to do it constantly at will on the eastern slope?

Mr. TOMLINSON. On the western slope the snow settles gradually and fills up when there is no water movement. None is started. And it just gradually builds up as snow and ice.

Mr. DEXHEIMER. I think I should like to add to that. It is not impossible for us to run water in those high-level collecting canals during that time, but the plan proposes that we would only operate them during the peak runoff and collect the excess flood flows. When we get the water over onto the east slope, then it is a different problem, and I think we have adequately planned so that those operations can be carried out without any difficulty due to freezing.

Mr. HOSMER. That is what I am getting at, Mr. Dexheimer. Your conclusion with respect to this is a subject matter which was not mentioned during the testimony of the witnesses, and I think it is probably important.

Mr. Chairman, I am due at the Supreme Court at the present time and I ask unanimous consent that I may continue later when the Department witnesses are back.

Mr. ASPINALL. You have that right.

Mr. DEXHEIMER. I want Mr. Powell to answer this question about the average year when it is feasible to gather water, the time of the year when it is feasible to gather water in collecting canals in western Colorado that will feed through the tunnel of the Fryingpan-Arkansas. Do you understand my question, Mr. Powell?

Mr. POWELL. The months it is feasible?

Mr. ASPINALL. Not particularly the months, but when can you begin to collect that water?

Mr. POWELL. Congressman Aspinall, if you will permit me, I will read from the table——

Mr. ASPINALL. You do not have to read——

Mr. POWELL. In the month of October 2.2 percent is diverted; November, 1.2 percent diverted; December 0.7. These are averages. January, 0.4; February, 0.1; March, 0.5; April, 2.5; May, 25.5; June,

45.4; July, 15.9; August, 3.8; and September, 0.8 percent: making a total——

Mr. ASPINALL. Of course, you did not get to the answer of my question at all. Maybe the fault is mine, but this is not what I am asking.

I want to know the time of the year when you can make your gathering ditches for the Fryingpan-Arkansas feasible to collect water. You are telling me when you can divert. Of course you can divert out of the reservoir at the western end of the tunnel. But when can you gather that water?

I have been up there. I know what happens, and I do not want this committee misled.

Mr. POWELL. We can gather it when the snow is melting.

Mr. ASPINALL. Sure, and I want to know what the average date is in a normal average year.

Mr. POWELL. Snow begins to melt and run, Mr. Congressman, about the 1st of May and becomes in considerable volume by the 15th.

Mr. ASPINALL. And the gathering ditches are filled with snow and ice from the preceding fall and winter, and the water runs right over those gathering ditches until the ice and snow in the gathering ditches itself melts. And it freezes up every night. That is when the snow starts melting. That is not when you can collect.

Mr. POWELL. Congressman, you will have to pardon something that got in the record here by accident. Over 97 percent of this water is collected by tunnels. The tunnels are kept clear all winter. The water runs direct from the stream into the tunnel. The system was designed that way intentionally so it could operate with great efficiency and there would be no question about clearing canals. There are some canals over there where it was specified to the people in western Colorado the diversions were to be made only in June and July. There are only 2 or 3 months they are allowed to take that water.

This particular tunnel right here, the end of this 6-mile tunnel, the west part is in the Fryingpan River proper, and there are available right there over 50,000 acre-feet of water that will drop right into the tunnel. There would not be a yard from the river into the edge of the tunnel. There is no ditch at all.

Mr. ASPINALL. You are not trying to tell this committee that 50,000 acre-feet of water to which you are referring can be diverted. A great deal of that water has prior uses.

Mr. POWELL. The study and the arrangement with the conference committee and by the State of Colorado covers that whole situation in our operating agreement.

Mr. ASPINALL. I appreciate that, and that is the reason that I am asking these questions.

Mr. POWELL. Mr. Congressman—I am just quoting from memory—about 50,000 feet of water does come, in the final analysis, from that——

Mr. ASPINALL. Then we do not need to have too much testimony here relative to the gathering canals?

Mr. POWELL. No, sir. The gathering canals is a very minor item.

Mr. ASPINALL. Your testimony so far last year and this year had to do with the gathering canals feeding into the tunnel.

Mr. POWELL. I realize that just as well as you do. I deplored the interpretation that they are all canals, and not practically all tunnels. I am the engineer who designed this project. It is not so.

Mr. ASPINALL. All right, just so we get the record straight.

The Chair recognizes the gentleman from California, Mr. Sisk.

Mr. SISK. Mr. Chairman, do I understand these gentlemen will be back?

Mr. ASPINALL. All of the gentlemen, with the exception of Mr. Powell and Mr. Lindseth, will be able to be back most any time, and I suppose if we need them and notify the Department officials we can bring them back.

Mr. SISK. Would it be in order for me to reserve what questions I might have until that time?

Mr. ASPINALL. It would be perfectly in order.

The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

The gentleman reserves his time and yields to the gentleman from Arizona if he has any questions at this time.

Mr. UDALL. I just have one or two. Do I understand that by action in the State of Colorado and agencies or agency you have adjusted among yourselves any water-right disputes? Are there any water-right controversies that exist regarding this project?

Mr. ASPINALL. Mr. Udall, we have not resolved the water rights, but the legal agency of Colorado has entered into what is known as an operating agreement which is for the purpose of protecting present uses in western Colorado and delivering to the people of Colorado waters that are found to be surplus as far as the facilities of this project are concerned.

Mr. UDALL. What agency is that?

Mr. ASPINALL. The Colorado Water Conservation Board, speaking for the State, and the other boards, the Colorado River Conservancy District Board, and the Southwestern Colorado Conservancy District Board, speaking for western Colorado interests.

Mr. UDALL. And that is an existing agreement? There is an existing agreement or arrangement then that takes care of any controversy that might arise?

Mr. ASPINALL. May I answer that this way? It is an agreement reached by the authorities speaking for Colorado for this particular project, and it is in the hearings of last year and in the Senate hearings of this year, and these witnesses will be questioned to some extent about that when the time gets around to the chairman.

Mr. UDALL. That is all I have at this time.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

Mr. CHENOWETH. I want to commend Mr. Aandahl and Mr. Dexheimer and Mr. Tomlinson for their very fine statements in support of this project. I think you have covered the details in a very complete manner.

In order to satisfy my colleague from Arizona who has raised the question as to the operating principles, is it not a matter of fact that the water users of the western slope and the eastern slope have agreed that this amount of water can be diverted and the western slope water users will be fully protected by the Aspen Dam?

Mr. DEXHEIMER. Yes, sir.

Mr. CHENOWETH. The members of the different water boards have agreed to this, have they not?

Mr. DEXHEIMER. Yes, sir.

Mr. CHENOWETH. And the only opposition as you stated, I believe, in answer to the question of Mrs. Pfost, was from the group at Aspen, Colo. I believe two individuals in particular have beautiful summer homes there that they hate to lose. And we hate to see these homes destroyed, but, as I understand, in order to carry out the details of the project and the construction of Aspen Dam, those homes must be taken. Would you care to amplify upon that situation?

Mr. DEXHEIMER. Yes, sir. The two owners that were previously named have property that would be affected. In the Aspen Reservoir area there are 320 acres covered with heavy brush and willows in the old stream channel, 80 acres are partially irrigated meadow, and 407 acres of steep rocky slope, and about 50 acres of sandbars. That is the entire area of the Aspen Reservoir, and within that area are two homes, as I pointed out, largely for summer homes, but some stock grazing on the irrigated or partially irrigated meadows.

Mr. CHENOWETH. As a matter of fact, Mr. Commissioner, is it not true that the water users of the western slope are going to be in a better position after the construction of this project than they are now by the completion of the Aspen Reservoir, because their water will be assured before any water is diverted from the western slope to the eastern slope?

Mr. ASPINALL. Will the gentleman yield?

Mr. CHENOWETH. Yes.

Mr. ASPINALL. For an addition to that question, if he will accept it—providing the operating agreement arrived at is entirely lived up to by the supervising authorities.

Mr. CHENOWETH. I assume that in the question.

Mr. DEXHEIMER. Yes, and as I pointed out, I think the bill before you provides that we must operate in accordance with that operating agreement, which will improve the west slope water users' position as regards their water supply.

Mr. CHENOWETH. Do you know of any intention on the part of anyone to violate the operating agreement?

Mr. DEXHEIMER. No, sir; I do not.

Mr. CHENOWETH. Have you heard any discussion of any possibility, by circumvention or any other process, directly or indirectly, that this operating agreement would be violated?

Mr. DEXHEIMER. No, sir; I have never heard of any such thing and we would not contemplate operating in that manner, nor permitting the operation in any other manner than is provided in the authorizing legislation.

Mr. CHENOWETH. I am sure that is true.

Mr. Commissioner, I was interested in your statement concerning your plans in the event this project is authorized by Congress. I believe you stated that you would start work immediately if funds were made available on the Aspen Reservoir, and the tunnel, and the Pueblo Reservoir.

Mr. DEXHEIMER. Yes, sir. I had the pleasure of accompanying the President over this project last fall, pointing out its features and what we planned to do in cooperation with the Secretary of Agriculture and the Secretary of the Interior, and after that trip the President heartily endorsed this project, and in his budget message to the Congress he endorsed and asked that it be authorized, and stated that,

if it were authorized in this session, he would propose a supplemental appropriation to get the work started because of the very serious water shortage in the area.

Mr. CHENOWETH. How much money would be spent in the first year? How much money would you ask for, Mr. Commissioner?

Mr. DEXHEIMER. We propose about $2 million, although that could be enlarged if it were appropriate considering other budget considerations.

Mr. ASPINALL. The first labors that you have to perform have to do with vital specifications and drawings and so forth; do they not?

Mr. DEXHEIMER. Yes, sir.

Mr. ASPINALL. And that would take approximately 18 months, would it not? I do not want these people misled from either side of the ridge. Construction could not possibly start, if you follow your usual procedures, until a lapse of a considerable length of time.

Mr. DEXHEIMER. The construction schedule, I believe, is presented in there, but we would make every effort, if we had construction funds this year, to get some of that work under way during the coming fiscal year. However, as the chairman realizes, we would not be able to make very extensive progress with only $2 million and with our plans having to be formalized and specifications issued.

Mr. ASPINALL. And the contracts signed between the Bureau and the users?

Mr. DEXHEIMER. Yes, sir.

Mr. ASPINALL. The time for this morning has expired. The Bureau representatives will hold themselves in readiness to appear back before this committee upon the call of the chairman, which is an undeterminable date as of this time because we do not have the time. We shall meet at 10 o'clock Wednesday morning to hear those appearing in favor of the project.

Mr. DEXHEIMER. We shall be happy to be back at the call of the chairman, and if the Chair wishes some of the men outside of Washington, we would like a few days' notice.

Mr. ASPINALL. Thank you very much.

The committee stands adjourned.

(Whereupon, at 12 noon, the subcommittee recessed, to reconvene at 10 a. m., on Wednesday, May 11, 1955.)

62757—55——4

FRYINGPAN-ARKANSAS PROJECT, COLORADO

WEDNESDAY, MAY 11, 1955

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D. C.

The subcommittee met, pursuant to recess, at 10 a. m., in the committee room, New House Office Building, Hon. Wayne N. Aspinall (chairman) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will now be in session for the further consideration of H. R. 412, by Congressman Chenoweth of Colorado's Third Congressional District.

As stated heretofore, today has been set aside for testimony to be given in these hearings by the proponents of the project. The Chair will endeavor to get time for a 2-hour session this afternoon. We will know before we close the session this morning.

The Chair would suggest that we proceed at this time as if we were only going to have but 2 hours and proceed as expeditiously as possible.

At this time the Chair recognizes his colleague from Colorado, Mr. Chenoweth, just to introduce the witnesses to the committee, and the Chair will call them in order.

Mr. CHENOWETH. Thank you, Mr. Chairman.

Our first witness this morning will be Mr. Ivan C. Crawford, who is director of the Colorado Water Conservation Board, Denver, Colo. I might state that Mr. Crawford has appeared before this committee many times and I believe his qualifications are fully recognized.

Mr. ASPINALL. That is correct, and I am glad to have you before the committee, Mr. Crawford.

STATEMENT OF IVAN C. CRAWFORD, DIRECTOR, COLORADO WATER CONSERVATION BOARD, DENVER, COLO.

Mr. CRAWFORD. My name is Ivan C. Crawford. I am the director of the Colorado Water Conservation Board which is the official agency of the State of Colorado charged with the duty of conserving, developing and protecting the water resources of the State of Colorado; and I appear here as a representative of the board.

This board, after a thorough study covering several years, has unanimously approved the Fryingpan-Arkansas project. I should like to submit for the record an excerpt from the minutes of the meeting of the board of February 22, 1951, at which time this unanimous approval was given.

Mr. ASPINALL. Without objection, the excerpts of the minutes will appear at this point in the record.

(The minutes referred to follow:)

[Excerpt from minutes of meeting of February 22, 1951, Colorado Water Conservation Board]

MOTION ADOPTING FRYINGPAN–ARKANSAS DIVERSION (FORMERLY KNOWN AS GUNNISON–ARKANSAS PROJECT, INITIAL PHASE)

Director Stone moved that, to make the record clear, the resolutions pertaining to the Fryingpan Arkansas project, passed by the Colorado River Water Conservation District Board and the Southwestern Water Conservation District Board, and as amended to include the words "federally financed," be included and made a part of the record of this meeting of the Colorado Water Conservation Board. The motion was seconded by John W. Beaty and, on vote being taken, the motion unanimously carried and was declared passed.

The resolutions of the Colorado River Water Conservation District Board and of the Southwestern Water Conservation District Board are as follows:

"A meeting of the board of directors of the Colorado River Water Conservation District was held at Grand Junction, Colo., on February 19, 1951, at the request of western Colorado members of the Colorado Water Conservation Board to consider and discuss the proposed Fryingpan-Arkansas diversion project, formerly referred to as the initial phase of the Gunnison-Arkansas project. All members of the board were present except Andrew Lindstrom."

The following resolution was offered by Charles R. Neill:

"RESOLUTION

"The board of directors of the Colorado River Water Conservation District in order to be cooperative in the furtherance of the policy of the State of Colorado, hereby concurs in the complete report of the policy and review committee appointed to consider the Fryingpan-Arkansas diversion project, which report as amended has been submitted to the Colorado Water Conservation Board, subject to the condition that section IV be amended to read as follows:

" 'IV. EFFECT OF APPROVAL OF PROJECT REPORT

" 'The committee recognizes that the approval of this report is not to serve as a precedent or example for the approval of any other transmountain diversion of major proportions not heretofore authorized.

" 'The policy of the State of Colorado, as initiated in statewide meetings held under the auspices of the State planning commission at Denver and Grand Junction, and as evidenced by resolutions dated June 15, 1935, and February 28, 1936, was not adhered to because surveys of the character mentioned in the said resolutions were not available to the committee. Nothing herein contained shall be deemed or construed as a precedent for Federal projects not heretofore authorized until adequate surveys have been made and the necessary data are available so that a general allocation or apportionment of the waters of the Colorado River, allocated for consumptive use in the State of Colorado, under the upper Colorado River Basin compact may be made, between eastern Colorado and western Colorado, as distinguished from an attempt to execute such State policy by a piecemeal or series of partial allocations, any of which may seriously interfere with a complete overall State program.'

"*Be it further resolved*, That in the opinion of the board of directors of the Colorado River Water Conservation District, the Colorado Water Conservation Board should adopt a resolution that no further federally financed transmountain diversions from the natural Colorado River Basin should be approved for authorization until the surveys described in said section IV above are completed and the need for the use of water in western Colorado has been determined.

"Mr. Neill moved the adoption of this resolution, which motion was seconded by Mr. Danni, and the motion was unanimously carried and the resolution declared unanimously adopted.

"Grand Junction, Colo., February 19, 1951.

"Certified a true and correct copy:

"F. C. MERRIELL, *Secretary*."

"THE SOUTHWESTERN WATER CONSERVATION DISTRICT,
"*Durango, Colo., February 14, 1951.*

"To the Colorado Water Conservation Board.
"Re Arkansas-Fryingpan project.

"President Dan B. Hunter presented a request that this board consider and act upon certain changes in the operating principles for the Arkansas-Fryingpan project and especially in section 15 as approved June 15, 1950.

"After due consideration, it was moved, seconded, and carried unanimously that because of the fact the matter has progressed so far, this board feels it should interpose no objection to the proposed diversion, but with the clear and distinct understanding this consent shall not be considered as waiver of objections to any other federally financed transmountain diversion of the waters of the Colorado River; and with the further understanding that the State water conservation board of the State of Colorado shall not approve of any other such federally financed diversion project until the studies of the needs of the western slope be fully completed so that an intelligent decision relative to such needs may be given. We feel that after the many and long delays in making such studies and the promises made by some high in authority in the Reclamation Service, the western slope is entitled to have such studies completed in the very near future, and that no further federally financed transmountain diversions should be made without the completion of such investigations.

"This consent and approval is made because this board is aware of the great and urgent need of Pueblo, Colorado Springs, and other nearby cities in the Arkansas Valley for additional water, and our desire to act the part of a good neighbor to these cities.

"Respectfully submitted.

"THE SOUTHWESTERN WATER CONSERVATION DISTRICT.
DAN B. HUNTER.
IRA E. KELLY.
ARCHIE B. TONER.
WILLIAM FINNEGAN.
D. LEWIS WILLIAMS.
WILLIAM A. WAY.
D. W. SEXTON."

The Colorado River Water Conservation District Board, as shown by its resolution which has been placed in the record of this meeting, requests the Colorado Water Conservation Board to amend article IV of the report of the policy and review committee by the insertion of certain language which it italicized for identification. It is understood that such inserted and additional language, identified by italics, will be shown in the resolution of the Colorado River Water Conservation District Board as inserted in this record.

It was moved by Judge Dan H. Hughes and seconded by C. J. McCormick that the resolution submitted by the Colorado River Water Conservation District be accepted and approved as a policy of the Colorado Water Conservation Board. On vote being taken, the motion unanimously carried and was declared adopted.

It was moved by Dan B. Hunter and seconded by John A. Cross, that the resolution submitted by the Southwestern Water Conservation District be accepted and approved as a policy of the Colorado Water Conservation Board. On vote being taken, the motion unanimously carried and was declared adopted.

Further discussion concerning the revision of the report of the policy and review committee and the operating principles of the Fryingpan-Arkansas project ensued.

It was moved by John A. Cross, and seconded by Judge Dan H. Hughes, that the report of the drafting committee to the policy and review committee (first phase, Gunnison-Arkansas project), as contained in the June 15, 1950, report to the Colorado Water Conservation Board by Clifford H. Stone, director of the board, with the modifications of the operating principles as set out in a letter from Jean S. Breitenstein, chairman of the drafting committee, to the director of the water board, dated February 3, 1951, and with those modifications of article IV: "Effect of Approval of Project Report" (p. 11 of the above-mentioned report of the drafting subcommittee of the policy and review committee), made in this board meeting of February 22, 1951, by the adoption of resolutions approved by the Colorado River Water Conservation District and the Southwestern Water Conservation District, be and is hereby formally approved.

On vote being taken, the motion unanimously carried and was declared adopted.

* * * * * * *

I hereby certify this to be an exact copy of a minute from the minutes of the meeting of the Colorado Water Conservation Board held February 22, 1951.

IVAN C. CRAWFORD, *Director.*

Mr. CRAWFORD. Pursuant to the provisions of the 1944 Flood Control Act, the State of Colorado has submitted its official comments and recommendations on this project to the Secretary of the Interior. I should like to submit to the committee an extract from the minutes of a meeting of the Colorado Water Conservation Board held on August 7, 1951, in which are included those comments and recommendations.

Mr. ASPINALL. Without objection, it is so ordered.

(The minutes referred to follow:)

EXTRACT FROM MINUTES OF AUGUST 7, 1951, MEETING OF THE COLORADO WATER CONSERVATION BOARD

OFFICIAL COMMENTS AND RECOMMENDATIONS OF THE STATE OF COLORADO ON THE INITIAL DEVELOPMENT, GUNNISON-ARKANSAS PROJECT, ROARING FORK DIVERSION, COLORADO

(Project Planning Report No. 7–8a. 49–1, Bureau of Reclamation, Department of the Interior, dated January 1950)

AUGUST 7, 1951.

The SECRETARY OF THE INTERIOR.

SIR: On behalf of the State of Colorado and pursuant to section 1 of the act of December 17, 1944 (58 Stat. 887), there are herewith transmitted the comments, views, and recommendations of the State of Colorado concerning the initial development of the Gunnison-Arkansas project, Roaring Fork diversion, being Project Planning Report No. 7–8a. 49–1, Bureau of Reclamation, Department of the Interior, dated January 1950.

These comments, views, and recommendations are submitted under the authority of chapter 265, Session Laws of Colorado, 1937, creating the Colorado Water Conservation Board, and defining its functions in accordance with the designation of such board by the Governor of the State of Colorado pursuant to section 1 of the act of December 17, 1944 (58 Stat. 887), as the official State agency to act in such matters.

The comments, views, and recommendations of Colorado submitted herewith are as follows:

1. Colorado recognizes that the waters of the Arkansas River in the Colorado portion of the upper Arkansas River Basin are overappropriated and that serious loss in crop production on presently irrigated farmland results. Stabilized agricultural economy in the area requires supplemental water supplies. Additional quantity and better quality of domestic and municipal water are critically needed in the Arkansas Valley, Colo., for the cities of Colorado Springs, Pueblo, and various valley towns. New sources must be found if necessary and dependable water supplies for a growing population are to be provided. The best economy and the most efficient use of limited sources of water require multiple-use project development which will serve the needs of agriculture, requirements for domestic and municipal water supplies, flood control, the preservation of recreational and fish and wildlife values, and the production of hydroelectric power. Neither further retirement of presently irrigated land to meet necessary and pressing municipal requirements for water nor project development designed to serve a single purpose would be consonant with the most desirable economic advancement of Colorado, or with the highest utilization of its limited water supplies.

2. Colorado concurs in the findings of the project report that the project described therein is engineeringly feasible, economically justified, and financially feasible, and that the proposed plan for the payment of reimbursable capital costs is in accordance with the Federal reclamation law.

3. The allocation of capital costs as between the various project features, including a nonreimbursable allocation to flood control and fish and wildlife preservation, is considered reasonable.

4. It is recognized that the allocation to the various project purposes of annual operation, maintenance, and replacement costs has been made to corre-

spond to the allocation of capital costs. Colorado recommends that an authorization of the project shall not preclude a readjustment of operation, maintenance, and replacement charges as between municipal and domestic users and power and irrigation users which might more accurately reflect the actual use of water by said users.

5. It is also recommended that the authorization of the project include the valley pipeline as referred to in said report for the use and benefit of the various valley towns.

6. Colorado calls attention to the fact that the project, its operation, maintenance, and the use of Colorado River water thereunder, must be subject to the provisions of the Colorado River compact of November 24, 1922 (H. Doc. 605, 67th Cong., 4th sess.), the upper Colorado River Basin compact of October 11, 1948 (Public Law 37, 81st Cong., 1st sess.), and the Boulder Canyon Project Act of December 21, 1928 (45 Stat. 1057–1064). Further reference to this matter appears in these comments in connection with the subject of operating principles. The features of the project and their operation for the storage and reregulation of the native waters of the Arkansas River are subject to the provisions of the Arkansas River compact of December 14, 1948 (Public Law 82, 81st Cong., 1st sess.), between Colorado and Kansas. On July 24, 1951, the Arkansas River Compact Administration, an agency created by the compact for its administration, after a review of the project report and consideration of the effect of the operation of the proposed project on the administration of the provisions of the compact, adopted the following resolution:

"Whereas there has been submitted to the States of Colorado and Kansas by the Secretary of the Interior, in accordance with provisions of section 1 of the 1944 Flood Control Act, a report of the Bureau of Reclamation on the proposed initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado (Project Planning Report No. 7–8a, 49–1), and such States are required to transmit to the Secretary of the Interior their respective official comments and recommendations on the report and proposed development; and

"Whereas the Arkansas River Compact Administration, an official interstate body created by the Arkansas River compact and charged with the administration of such compact, is interested in the proposed development to the extent that its construction and operation shall not interfere with the rights, interests, and obligations of Colorado and Kansas under the compact: Now be it

"*Resolved by the Arkansas River Compact Administration*, That the following comments and recommendations relating to said report of the Secretary of the Interior, to wit:

"The Arkansas River Compact Administration submits these comments and recommendations to the Governors of Colorado and Kansas respecting the proposed initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, namely:

"1. The administration understands that the project plan proposes:

"(*a*). The importation by appropriate project works of approximately 70,000 acre-feet of water a year from the Colorado River Basin to the Arkansas River Basin for supplemental irrigation and domestic water supplies in Colorado and for the production of hydroelectric energy.

"(*b*) In connection with such importation of water and its regulation in the Arkansas River Valley by project works, the reregulation of native waters of the Arkansas River (the term 'native waters,' is herein used, being those waters covered and defined by article III–B of the Arkansas River compact).

"2. The Interstate water relations of Colorado and Kansas with respect to the Arkansas River do not justify any objection to the proposed project development for the importation of Colorado River water (described in subpar. (a) above).

"3. The reregulation of native waters of the Arkansas River (native waters being as above mentioned concerns the Arkansas River Compact Administration and both Colorado and Kansas in complying with the provisions of the Arkansas River compact and maintaining the benefits and obligations of the two States under that compact. To that end it is recommended to the Governors of Colorado and Kansas, and expressed as a policy of the Arkansas River Compact Administration, that the initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, as set forth in Project Planning Report No. 7–8a, 49–1 of the Bureau of Reclamation, be approved: *Provided, however*, That there shall be no reregulation of native waters of the Arkansas River as proposed in such report until a plan of operation, rules, regulations, procedures, and agreements in the furtherance thereof, including any pertinent

agreements between the Corps of Engineers and the Bureau of Reclamation, shall have been submitted to, and approved by, the Arkansas River Compact Administration and the affected water users.

"4. It is the purpose and intent of these recommendations that the proposed project development shall not interfere with or defeat the rights, interests, and obligations of Colorado and Kansas under the Arkansas River compact—

"be transmitted to the Governors of the States of Colorado and Kansas and such Governors be and are hereby requested to submit the same to the Secretary of the Interior with their official State comments and recommendations upon said proposed project and development."

Colorado interprets and understands that paragraph 3 of the resolution of the Arkansas River Compact Administration is controlled by paragraph 4 thereof; and that the words "affected water users" in said paragraph 3 mean only water users in the State of Colorado so long as Colorado complies with the terms of said compact.

7. Paragraph 74, pages 27 to 33, both inclusive, under the heading "Operating principles," contains the operating principles which the report explains were recommended by a policy and review committee set up by the Colorado Water Conservation Board to study and review plans and reports on the first stage of the Gunnison-Arkansas project. This committee was composed of representatives of the board, the Colorado Game and Fish Commission, western Colorado, the Arkansas Valley, and the city of Colorado Springs. The report fails to explain that such committee was required to report to the Colorado Water Conservation Board and its recommendations would not be effective until approved by that board. The report on the project does not disclose what action was taken by the board nor does it contain all of the recommendations of the policy and review committee. Some of the matters contained in the report of the committee are not strictly concerned with the project operation, but are related to, and constitute a material part of such operating principles.

The recommendations of the policy and review committee were revised and approved by the Colorado Water Conservation Board on February 22, 1951. (See letter with attachments of the director of the Colorado Water Conservation Board dated February 27, 1951, and addressed to the director of region 7, Bureau of Reclamation.) Paragraph 74, pages 27 to 33, both inclusive, of the report correctly sets forth that part of the report of the policy and review committee, designated article II operating principles as revised and approved by the Colorado Water Conservation Board, but it omits other material portions of the committee's report as revised and approved by the board, namely:

"The action of the policy and review committee will be presented to the Colorado Water Conservation Board for such action as the board deems proper.

"The action of the Colorado Water Conservation Board will be incorporated in the official comments of the State of Colorado, made pursuant to section 1 of the 1944 Flood Control Act.

"The authorization of the project will recognize the operating principles approved by the Colorado Water Conservation Board.

"Prior to commencement of project construction, the following conditions precedent must be satisfied:

"(*a*) There will be executed a payment contract between the Eastern Colorado Conservancy District and the United States in which will be incorporated the approved operating principles.

"(*b*) There will be executed such contract with the Twin Lakes Reservoir & Canal Co. as is necessary to make effective the approved operating principles.

"(c) The Eastern Colorado Conservancy District will firmly bind itself to the operation of the project in accordance with the approved operating principles.

"It is recommended that this project shall hereafter be referred to as the Fryingpan-Arkansas project. Approval of this provision by eastern Colorado representatives shall not be implied as an abandonment of their expressed intention to obtain approval of a project from the Gunnison River nor shall approval of this provision by western Colorado representatives be construed as any consent on their part to the authorization of a project for the exportation of water from the Gunnison River to eastern Colorado.

"The committee recognizes that the approval of this report is not to serve as a precedent or example for the approval of any other transmountain diversion of major proportions not heretofore authorized.

"The policy of the State of Colorado as initiated in statewide meetings held under the auspices of the State planning commission at Denver and Grand

Junction, and as evidenced by resolutions dated June 15, 1935, and February 28, 1936, was not adhered to because surveys of the character mentioned in said resolutions were not available to the committee. Nothing herein contained shall be deemed or construed as a precedent for Federal projects not heretofore authorized until adequate surveys have been made and the necessary data are available so that a general allocation or apportionment of the waters of the Colorado River, allocated for consumption use in the State of Colorado, under the upper Colorado River Basin compact, may be made between eastern Colorado and western Colorado, as distinguished from an attempt to execute such State policy by a piecemeal or series of partial allocations, any of which may seriously interfere with a complete, overall State program."

Paragraph 88 of the report under the heading "Recommendations," states:

"E. The project be operated under the direction of the Secretary of the Interior in accordance with the operating principles set forth in this report or as principles may be modified in the future by agreement between the Secretary and the commission established by the State of Colorado."

It is understood that the operating principles, mentioned in this quotation from the report, are those set forth in paragraph 74, pages 27 to 33, both inclusive, and that the "commission" mentioned therein is the commission which may be created in the manner and for the purpose set forth in paragraph 17 of the operating principles. (See p. 33 of the report.)

Colorado's approval of the plans set out in the report and of the authorization of the project is conditioned upon compliance with the operating principles set forth in the report (see par. 74, pp. 27 to 33, both inclusive) and also full recognition and compliance with those portions of the policy and review committee's report, as revised and approved by the Colorado Water Conservation Board, which are omitted from the report and which are hereinabove set out; except that as to the name of the project, it is recommended and urged that in an appropriate manner the project should hereafter be known and referred to as the "Fryingpan-Arkansas project." It is noted from the letter of the Commissioner of Reclamation to the Secretary of the Interior, contained in the report, that it is stated:

"* * * This development is designed as a self-contained unit, and its construction would not imply a commitment for developing future water supplies in the Gunnison River Basin for diversion to the Arkansas River Basin."

Colorado approves this statement but such a statement lends weight to the reason for changing the name of the project as herein recommended. Diversion from the Fryingpan River to the Arkansas River has no relation to the Gunnison River. It is not proposed under this "self-contained" project to divert water to the Arkansas Basin from the Gunnison River. The identification of the project on the cover of the report and used throughout the report, "Initial Development, Gunnison-Arkansas project, Roaring Fork diversions, Colorado" is a misnomer and misleading, and in the future may, in some manner, lead to unwarranted implications. In addition to the recommended change in project identification, Colorado requests that the project be authorized as the "Fryingpan-Arkansas project."

8. The Colorado River Water Conservation District is an agency created by State statute (ch. 20, p. 997, Session Laws of Colorado, 1937) for the conservation, use, and development of the water resources of the Colorado River and its principal tributaries. The area comprised within the district includes seven counties and a part of an eighth county within the natural drainage of the Colorado River in western Colorado. The Southwestern Water Conservation District is an agency created by State statute (ch. 231, p. 866, Session Laws of Colorado, 1941) for the conservation, use, and development of the water resources of the San Juan and Dolores Rivers and their principal tributaries. The district comprises seven counties and part of an eighth county within the natural basin of the Colorado River in western Colorado. When the board of directors of each of these two districts passed upon the report and recommendations of the policy and review committee, including the operating principles, as revised, their separate resolutions, among other things, contained the following language:

COLORADO RIVER WATER CONSERVATION DISTRICT BOARD

"*Be it further resolved*, That in the opinion of the board of directors of the Colorado River Water Conservation District, the Colorado Water Conservation Board should adopt a resolution that no further federally financed transmountain diversions from the natural Colorado River Basin should be approved for

authorization until the surveys described in said section IV above are completed and the need for the use of water in western Colorado has been determined." (Sec. IV, to which reference is made, is shown by the two paragraphs contained in the report of the policy and review committee, quoted on page 5 of these comments, and commencing with the words "The committee recognizes" and "The policy of the State," respectively.)

SOUTHWESTERN WATER CONSERVATION DISTRICT BOARD

"* * * this board feels it should interpose no objection to the proposed diversion, but with the clear and distinct understanding this consent shall not be considered as waiver of objections to any other federally financed transmountain diversion of the waters of the Colorado River; and with the further understanding that the State Water Conservation Board of the State of Colorado shall not approve of any other such federally financed diversion project until the studies of the needs of the western slope be fully completed so that an intelligent decision relative to such needs may be given. We feel that after the many and long delays in making such studies and the promises made by some high in authority in the Reclamation Service, the western slope is entitled to have such studies completed in the very near future, and that no further federally financed transmountain diversions should be made without the completion of such investigations."

At the meeting of the Colorado Water Conservation Board on February 22, 1951, when the revised report of the policy and review committee, including revised operating principles for this project, was approved by the Colorado Water Conservation Board, the board unanimously approved two motions which provided that the resolutions, above mentioned and partially quoted, submitted by the Colorado River Water Conservation District and the Southwestern Water Conservation District be accepted and approved as a policy of the Colorado Water Conservation Board.

9. Paragarph 68 commencing on page 23 in about the middle thereof states: "The proposed basic rate of $3.60 per acre-foot at the Pueblo Reservoir has been determined to be within the payment capacity of the water users." It is respectfully requested that such proposed charge should not constitute either a maximum or a minimum charge nor should it indicate a uniform charge or indicate where water will be used or whether or not consideration in fixing charges can be given to return flows from such use. The figure is purely an estimated average charge per acre-foot and the district in allocating such water should be allowed complete latitude in connection therewith.

10. Paragraph 68 as contained on page 24 has the following sentence: "The district would assume responsibility for delivery of irrigation water." This responsibility is certainly not that of the United States, but neither should the district be responsible for patrolling every ditch. If water is turned out from the reservoir, it is immediately subject to the control of the State water officials, who should be advised of such rights in water and who are charged with the responsibility of delivering the same to the correct ditch. It is contemplated that each ditch will do its own policing.

11. Attention is directed to paragraph 68 on page 24 and the sentence reading "This district or possibly another entity would contract with the Government for Federal construction of the specific municipal water system * * *." It is contemplated that a proper repayment entity under Colorado laws such as a metropolitan-water district may be created for this particular purpose or that a joint contract executed between the various municipalities utilizing this feature will be executed and the project's authorization should be sufficiently broad to authorize any such contract deemed desirable.

12. Page 24 in the tabulation on function and source of revenue contains the following: "District tax (132 million at 1 mill minus), 10 percent, $119,000."

Attention is directed to the fact that under Colorado law, three possible rates are in existence; one-half of 1 mill, being the rate prior to delivery of project water; 1 mill, being the rate after such project water becomes available, and prior to the time of any deficiency or default; and 1½ mills in the event of default or deficiency. Levies in any of these three categories may be less but cannot exceed these figures.

13. Attention is directed to page 24, the item captioned "Municipal and industrial water, municipal supplies (38,000 acre-feet at various rates)." It is respectfully pointed out that it may be some years before this amount of water is utilized and that the quantity indicated is but an estimate which may be exceeded ultimately. The authorization of the project should not preclude

the possibility of charging municipalities lower rates during the period of time that such water is not actually required for the municipal needs. Pueblo might ultimately require 10,000 acre-feet and desire at the outset to commit herself for the immediate purchase of 5,000 acre-feet. Until such time as she actually requires 10,000 acre-feet of water, she should not be charged therewith at the proposed rates. The project authorization should permit charging lower rates until the water is used for municipal purposes.

14. Attention is directed to paragraph 70 on page 25. It is respectfully suggested that the report makes no reference to potential evaporation savings by moving shallow plains storage reservoirs upstream and storing the same quantities of water at higher altitudes.

15. Attention is directed to a statement in the middle of page 38, reading:

"Such contracts should include provisions for the right of renewal thereof once or more than once under stated terms and conditions mutually agreeable to the parties and subject to increase or decrease in rates corresponding to increase or decrease of cost of construction and of operation, maintenance or improvement or deterioration in the payment ability of the water users."

This sentence must be reconciled with the existing Colorado law which is set forth in chapter 266 of the Session Laws of Colorado, 1937, being section 19 thereof, which requires the petition for allocation of water filed by the water user and addressed to the conservancy district to contain therein the charge to be imposed for each acre-foot of water. The statute requires the petition to contain the following: (1) Name of applicant, (2) quantity of water to be purchased or otherwise acquired, (3) descriptions of lands upon which the water will be used and attached, (4) price per acre-foot to be paid, (5) whether payments will be made in cash or annual installments, (6) agreement that the annual installments and the charges for maintenance and operating shall become a tax lien upon the lands for which such water is petitioned and allotted and to be bound by the provisions of this act and the rules and regulations of the board. While it was contemplated initially that the price per acre-foot would be fixed, such as, in the case of the Colorado-Big Thompson project, $1.50 per acre-foot, it is believed that this statutory provision can be complied with by stating the price per acre-foot shall be not less than $_____ nor more than $_____.

Respectfully submitted.

DAN THORNTON,
Governor, State of Colorado, and Ex Officio Chairman of the Colorado Water Conservation Board.

CLIFFORD H. STONE,
Director, Colorado Water Conservation Board.

Without further discussion a vote was taken and the motion unanimously carried and was declared adopted.

I certify the official comments and recommendations of the State of Colorado on the initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, is a true and correct copy as it appears in the minutes of the August 7, 1951, meeting of the Colorado Water Conservation Board.

IVAN C. CRAWFORD, *Director.*

Mr. CRAWFORD. In the hearings before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs, United States Senate, 83d Congress, 1st session, on S. 964, Mr. Breitenstein made the following statement:

The fact that the project contemplates the use of Colorado River water on the eastern slope of Colorado brings it within the difficulty which has existed in Colorado for some years between the two slopes. Of course, that is an internal matter for Colorado, and I will pass over it briefly. I want the committee to understand that the Colorado Water Conservation Board, with a realization of the internal situation in Colorado, created what was known as the policy and review committee. That committee had on it representatives of both the eastern and western slopes. Also, because of the recreational values of the area from which the water is taken, it had representation from the Colorado Game and Fish Department, and from the Federal Fish and Wildlife Service.

The committee consulted with representatives of the Bureau of Reclamation, leading engineers in private employment, and lawyers familiar with the Colorado problems. The committee spent more than 2½ years studying the situation and in resolving the differences between the two areas of Colorado. They came up

with certain principles which they deemed should govern the operation of this project.

A drafting committee was then appointed; I was the chairman of that committee. The operating principles were reduced to the form in which they now appear in Senate Document 106.

I submit an extract from the minutes of the meeting of February 22, 1952, of the Colorado Water Conservation Board which contain the approval of the operating principles mentioned in Mr. Breitenstein's statement and sets them forth at length.

Mr. ASPINALL. Without objection, it is so ordered.

(The minutes referred to follow:)

EXTRACT FROM MINUTES OF MEETING OF FEBRUARY 22, 1952, COLORADO WATER CONSERVATION BOARD

The operating principles for the first phase, Gunnison-Arkansas project (Fryingpan-Arkansas project), the recommendations for the change in the name of the project (art. III below), and the effects of the approval of the project report (art. IV below), as amended and approved by the action of the Colorado Water Conservation Board on this 22d day of February 1951, are as follows:

"The construction and operation of the project involve the diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the Arkansas River Basin. The project contemplates—

"(*a*) The maximum conservation and the use of the diverted waters:

"(*b*) the protection of western Colorado water uses, both existing and potential, in accordance with the declared policy of the State of Colorado; and

"(*c*) the preservation of recreational values.

"In order to accomplish such purposes the project shall be operated by the United States in compliance with the Federal reclamation laws, the laws of the State of Colorado relating to the appropriation, use, or distribution of water, and the following operating principles:

"1. As used herein,

"(*a*) 'Project' means that certain enterprise planned and designed by the Bureau of Reclamation, Department of the Interior, for the transmountain diversion of water from the headwaters of the Fryingpan River and other tributaries of the Roaring Fork River to the basin of the Arkansas River, together with all of its appurtenant works and facilities in both eastern and western Colorado.

"(*b*) 'Eastern Colorado' means that portion of the State of Colorado lying within the natural drainage basin of the Arkansas River.

"(*c*) 'Western Colorado' means that portion of the State of Colorado lying within the natural drainage basin of the Colorado River and served by diversions made from the Colorado River, or its tributaries, above its confluence with the Gunnison River.

"(*d*) 'Eastern Colorado Conservancy District' means that entity to be hereafter created to contract for payment to the United States of an appropriate portion of project costs allocated to certain water uses in eastern Colorado.

"(*e*) 'Aspen Reservoir' means not only the reservoir presently planned for construction near the town of Aspen as part of the project but also, unless the context requires otherwise, any other reservoir that may be constructed in western Colorado above the town of Aspen in lieu of that reservoir for the purpose of protecting water uses in western Colorado.

"(*f*) 'C. f. s.' means cubic feet of water per second of time.

"2. The Aspen Reservoir shall be constructed and maintained on the Roaring Fork River above the town of Aspen, Colo., with an active capacity of about 28,000 acre-feet and with a reasonable expectancy that it will fill annually. The 28,000 acre-feet of water stored therein shall be available for replacement purposes in western Colorado. All of such stored water shall be released under the conditions and limitations hereinafter set forth.

"3. The cost of construction and perpetual operation and maintenance of the Aspen Reservoir shall be a charge against the project and shall be paid from project revenues or as otherwise provided by the Congress of the United States.

"4. The Aspen Reservoir shall be completed before any water is diverted to eastern Colorado by means of the project.

"5. The primary purpose of Aspen Reservoir is to furnish, in like manner as if the project were constructed by a water-conservancy district organized pursuant to the laws of the State of Colorado, the water required for the protection of western Colorado water users by the provisions of section 1, chapter 192, Colorado Sessions Laws, 1943, reading as follows: '*Provided, however*, That any works or facilities planned and designed for the exportation of water from the natural basin of the Colorado River and its tributaries in Colorado, by any district created under this chapter, shall be subject to the provisions of the Colorado River compact and the Boulder Canyon Project Act, as amended; that any such works or facilities shall be designed, constructed, and operated in such a manner that the present appropriations of water, and in addition thereto prospective uses of water for irrigation and other beneficial consumptive-use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the natural basin of the Colorado River in the State of Colorado, from which water is exported, will not be impaired nor increased in cost at the expense of the water users within the said natural basin; and that the facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of, any project plans for the exportation of water from said natural basin in Colorado.'

"6. The replacement capacity of the Aspen Reservoir is that portion of the total reservoir capacity required to protect existing rights to the use of water in western Colorado for domestic, irrigation, and manufacturing purposes (including power generation), and hereafter acquired rights to use of water in western Colorado for domestic, irrigation, and manufacturing purposes (excluding power generation) against any and all losses of needed water because of stream depletions resulting from project operations. In the determination of such replacement capacity, consideration shall be given to, but not necessarily limited to, needs for water for the following purposes, such needs, however, not to be for quantities in excess of those quantities of water which would have been available from the Roaring Fork River to supply such needs if the project had not been constructed:

"(*a*) to supply existing rights below Aspen Reservoir;

"(*b*) to irrigate new land and provide for supplemental irrigation in western Colorado;

"(*c*) to satisfy the obligation of the Roaring Fork River to contribute its proportional share of the required winter flows at a point immediately below the confluence of the Roaring Fork River and the Colorado River; and

"(*d*) to satisfy the obligation of the Roaring Fork River to contribute its proportional share of a demand of at least 300,000 acre-feet of water annually in the Colorado River below its confluence with the Roaring Fork River for domestic and manufacturing uses. Said demand for use in western Colorado is to be met at the times and in the amounts required.

"Water stored in the replacement capacity of the Aspen Reservoir shall be released by the United States upon the request of the State administrative agency having responsible charge of the distribution of the water of the stream or streams affected, whenever the needs in the Colorado River Basin in western Colorado below the project diversion points for the uses covered by this paragraph 6 exceed the available supply of water: *Provided*, That the rate of release of such stored water shall be reasonable and proper, with due regard for the needs in western Colorado for replacement water and with due regard also for the obligation of the project to supply such water.

"No charge shall ever be imposed for water released from, or made available by reason of releases from, the replacement capacity of the Aspen Reservoir.

"7. That portion of the total capacity of the Aspen Reservoir not needed as replacement capacity constitutes surplus capacity. Water stored in such surplus capacity may be sold or leased by the United States to water users in western Colorado. Charges for the use of such water shall be comparable to charges for use of project water for similar purposes in eastern Colorado with appropriate adjustment for the repayment ability of such water users. If it hereafter appears that the cost of procuring water, from sources other than the surplus capacity of the Aspen Reservoir, for the same uses as those to which water from the surplus capacity of the reservoir is to be made available shall have been increased by reason of the construction and operation of the project, then the charges for water released from the surplus capacity shall be diminished by the amount of such increase in cost.

"8. Project diversions from Lime Creek shall be made only in the months of May and June of each year.

"9. To protect recreational values, including fishing, no diversions from western Colorado will be made which reduce the remaining aggregate stream flows to less than either of the following minimum standards:

"(*a*) The Fryingpan collection system at the points of diversion collectively, exclusive of Lime Creek—15 cubic feet per second, October 1 through March 31; 30 cubic feet per second, April 1 through September 30;

"(*b*) near Norrie (immediately below the junction of North Fork and Fryingpan River)—30 cubic feet per second, October 1 through March 31; 100 cubic feet per second, April 1 through April 30; 150 cubic feet per second, May 1 through May 31; 200 cubic feet per second, June 1 through June 30; 100 cubic feet per second, July 1 through July 31; 75 cubic feet per second, August 1 through August 31; 65 cubic feet per second, September 1 through September 30.

"In maintaining the above minimum standards, the project diversions shall be regulated, so far as is practicable, in such a manner that the North Fork, the Fryingpan River, and each of the tributaries of those streams, shall contribute to the residual streamflows required by those minimum standards quantities of water in proportion to their natural contributions.

"10. An appropriate written contract shall be made whereby the Twin Lakes Reservoir & Canal Co. shall refrain from diverting water whenever the natural flow of the Roaring Fork River and its tributaries shall be only sufficient to maintain a flow equal to or less than that required to maintain the recommended average flows in the Roaring Fork River at the head of the proposed Aspen Reservoir in a quantity proportionate to the respective natural contributions of those streams from which diversions are made to the natural flow of the Roaring Fork River. The recommended average flows above mentioned are flows in quantities equal to those recommended as a minimum at the head of the Aspen Reservoir, according to the following schedule submitted by the United States Fish and Wildlife Service and the Colorado Game and Fish Commission:

Month	Average second-feet	Thousand acre-feet	Month	Average second-feet	Thousand acre-feet
October	44	2.7	May	100	6.2
November	35	2.1	June	120	2.1
December	29	1.8	July	100	6.2
January	26	1.6	August	63	3.9
February	25	1.4	September	44	2.6
March	24	1.5			
April	64	3.8	Total		40.9

"In maintaining the above averages, at no time shall the flow be reduced below 15 cubic feet per second during the months of August to April, inclusive, or below 60 cubic feet per second during the months of May to July, inclusive, providing the natural flow during said period is not less than these amounts. The obligation to supply the minimum streamflow as set forth in the above table on the Roaring Fork River shall, to the extent of 3,000 acre-feet annually, be a project obligation to be supplied from any waters diverted from the south tributaries of Hunter Creek, Lime Creek, Last Chance Creek, or any of them.

"The Twin Lakes Reservoir & Canal Co. shall not be required to refrain from diverting water under its existing decrees from the Roaring Fork River except to the extent that a like quantity of replacement water is furnished to said company without charge therefor through and by means of project diversions.

"If by reason of storage capacity in the Aspen Reservoir, the Twin Lakes Reservoir & Canal Co. derives additional water or other benefits or advantages it would not have realized had this project not been constructed, then nothing herein contained shall prevent the project from making appropriate charges for such water or other benefits or advantages.

"11. All lands acquired for project construction and operation and water surfaces of project reservoirs will be open to the public for recreational purposes, excepting those areas reserved by the operating agency.

"12. The project will be operated in such a manner that those in eastern Colorado using project water imported from the Colorado River Basin for domestic purposes shall have preference over those claiming or using water for any other purpose.

"13. The project is to be operated in such a manner as to secure the greatest benefit from the use and reuse of imported project waters within the project boundaries in the State of Colorado.

"14. Any and all benefits and rights of western Colorado water users in and to water stored in Green Mountain Reservoir, as described and defined in Senate Document 80, 75th Congress, 1st session, shall not be impaired or diminished by this project.

"15. The project, its operation, maintenance, and use shall be subject to the provisions of the upper Colorado River Basin compact of October 11, 1948 (Public Law 37, 81st Cong., 1st sess.), the Colorado River compact of November 24, 1922 (H. Doc. 605, 67th Cong., 4th sess.), and the Boulder Canyon Project Act of December 21, 1928 (45 Stat. 1057–1064). In the event any curtailment of use of Colorado River water in the State of Colorado is necessary to satisfy the provisions of the Colorado River compact or the upper Colorado River Basin compact, then the diversions by the project for use in eastern Colorado shall be curtailed before there is any curtailment of the right to store water in Aspen Reservoir in a quantity not in excess of the capacity of that reservoir for use in western Colorado in accordance with these operating principles.

"16. The Secretary of the Interior shall at any time have the option to obtain or require the transfer to the United States of any and all rights initiated or acquired by the appropriation or use of water through the works of the project in eastern Colorado, except vested rights to present appropriations: *Provided, however,* That the title so taken shall be subject to a beneficial use of such water as may be provided in the payment contract or contracts. The rights to store water in Aspen Reservoir under the applicable laws of the State of Colorado shall be initiated and acquired by and held in the name of the United States pursuant to those laws.

"17. To assure project operation in conformity with the operating principles heretofore stated, to provide a means for the collection and interchange of information, and to provide a method for the continued study of project operations to the end that, if the stated operating principles may be improved upon, recommendations for changes may be made to the contracting parties, a commission shall be created in an appropriate manner to be composed of 1 representative of the Eastern Colorado Conservancy District, 1 representative of the Colorado River Water Conservation District, 2 representatives of the United States, and 1 representative of the State of Colorado appointed by the Colorado Water Conservation Board after consultation with the Colorado Game and Fish Commission. The powers of such commission shall be limited to the collection of data, the making of findings of fact, and the suggestion of changes in operating principles."

ARTICLE III. *Name of project.*—"It is recommended that this project shall hereafter be referred to as the Fryingpan-Arkansas project. Approval of this provision by eastern Colorado representatives shall not be implied as an abandonment of their expressed intention to obtain approval of a project from the Gunnison River nor shall approval of this provision by western Colorado representatives be construed as any consent on their part to the authorization of a project for the exportation of water from the Gunnison River to eastern Colorado."

ARTICLE IV. *Effect of approval of project report.*—"The committee recognizes that the approval of this report is not to serve as a precedent or example for the approval of any other transmountain diversion of major proportions not heretofore authorized.

"The policy of the State of Colorado, as initiated in statewide meetings held under the auspices of the State planning commission at Denver and Grand Junction, and as evidenced by resolutions dated June 15, 1935, and February 28, 1936, was not adhered to because surveys of the character mentioned in said resolutions were not available to the committee. Nothing herein contained shall be deemed or construed as a precedent for Federal projects not heretofore authorized until adequate surveys have been made and the necessary data are available so that a general allocation or apportionment of the waters of the Colorado River, allocated for consumptive use in the State of Colorado, under the upper Colorado River Basin compact, may be made, between eastern Colorado and western Colorado, as distinguished from an attempt to execute such State policy by a piecemeal or series of partial allocations, any of which may seriously interfere with a complete, overall State program.

"In conformity with the foregoing, no further federally financed transmountain diversions of water from the natural Colorado River Basin shall be approved by the Colorado Water Conservation Board for authorization until the surveys hereinabove described are completed and the need for the use of water in western Colorado has been determined."

I hereby certify this is a true copy of a minute from the minutes of the meeting of the Colorado Water Conservation Board held February 22, 1951.

IVAN C. CRAWFORD, *Director.*

Mr. CRAWFORD. I would also like to submit, Mr. Chairman, an extract from the minutes of July 24, 1951, meeting of the Arkansas River Compact Commission, containing a resolution pertaining to the Fryingpan-Arkansas project approving the same, subject to certain restrictions.

Mr. ASPINALL. Without objection, it is so ordered.

(The minutes referred to follow:)

EXTRACT FROM MINUTES OF JULY 24, 1951, MEETING OF THE ARKANSAS RIVER COMPACT ADMINISTRATION

GUNNISON-ARKANSAS PROJECT, ROARING FORK DIVERSION (ARKANSAS-FRYINGPAN)

It was moved by Representative Tate and seconded by Representative Nevius that the administration approve and adopt the report of the special committee and incorporate the committee's report in a resolution submitted by the legislative and legal committee as follows:

"Whereas the Arkansas River Compact Administration, an official interstate body created by the Arkansas River compact and charged with the administration of such compact, is interested in the proposed development to the extent that its construction and operation shall not interfere with the rights, interests, and obligations of Colorado and Kansas under the compact: Now, be it

"*Resolved by the Arkansas River Compact Administration*, That the following comments and recommendations relating to said report of the Secretary of the Interior to wit:

"The Arkansas River Compact Administration submits these comments and recommendations to the Governors of Colorado and Kansas respecting the proposed initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, namely:

"1. The administration understands that the project plan proposes:

"(*a*) The importation by appropriate project works of approximately 70,000 acre-feet of water a year from the Colorado River Basin to the Arkansas River Basin for supplemental irrigation and domestic water supplies in Colorado and for the production of hydroelectric energy.

"(*b*) In connection with such importation of water and its regulation in the Arkansas River Valley by project works, the reregulation of native waters of the Arkansas River. (The term 'native waters,' as herein used, being those waters covered and defined by art. III–B of the Arkansas River compact.)

"2. The interstate water relations of Colorado and Kansas with respect to the Arkansas River do not justify any objection to the proposed project development for the importation of Colorado River water (described in subparagraph (*a*) above).

"3. The reregulation of native waters of the Arkansas River (native waters being as above mentioned) concerns the Arkansas River Compact Administration and both Colorado and Kansas in complying with the provisions of the Arkansas River compact and maintaining the benefits and obligations of the two States under the compact. To that end, it is recommended to the Governors of Colorado and Kansas, and expressed as a policy of the Arkansas River Compact Administration, that the initial development, Gunnison-Arkansas project, Roaring Fork diversion, Colorado, as set forth in Project Planning Report No. 7–8a, 49–1 of the Bureau of Reclamation, be approved: *Provided, however*, That there shall be no reregulation of native waters of the Arkansas River as proposed in such report until a plan of operation, rules, regulations, procedures, and agreements in furtherance thereof, including any pertinent agreements between the Corps of Engineers and the Bureau of Reclamation, shall have been submitted to, and approved by, the Arkansas River Compact Administration and the affected water users.

"4. It is the purpose and intent of these recommendations that the proposed project development shall not interfere with or defeat the rights, interests, and obligations of Colorado and Kansas under the Arkansas River compact.

be transmitted to the Governors of the States of Colorado and Kansas and such Governors be and are hereby requested to submit the same to the Secretary of Interior with their official State comments and recommendations upon said proposed project and development."

On vote being taken, the motion carried and was declared adopted.

The above extract was taken from the set of minutes of the Arkansas River Compact Administration, filed in the office of the Colorado Water Conservation Board.

IVAN C. CRAWFORD, *Director.*

Mr. CRAWFORD. The diversion water supply of the Fryingpan-Arkansas project:

A study of the water supply of the Fryingpan-Arkansas project is concerned principally with the determination of (1) the available supply at the point of diversion, (2) the effect on the flow of the river within the State of Colorado of diverting the water to the eastern slope, and (3) the effect of this diversion on Colorado River flow at Lee Ferry.

AVAILABLE SUPPLY AT POINT OF DIVERSION

The project plans call for the diversion of 69,200 acre-feet of water from this watershed to the east side of the Continental Divide. The Colorado Water Conservation Board through its policy and review committee appointed an engineering advisory committee in 1949 to study the water-supply question and to make recommendations to the board. This committee concurred in the water-supply estimates of the Bureau of Reclamation including the amount of water required for fish life as recommended by the Colorado Game and Fish Commission and agreed to in the operating principles which were set up to govern the operation of the project. The quantities of water available as estimated by the Colorado Water Conservation Board were in close agreement with those determined by the Reclamation Bureau.

Provision is made to bring additional water to the east side for the Twin Lakes Canal & Reservoir Co. which now operates the Independence Pass tunnel. The company has been diverting an average of approximately 35,000 acre-feet from the Roaring Fork River, but its rights would permit a total of about 53,000 acre-feet. The full amount is not diverted because of lack of storage capacity on the east slope to regulate and make it available. By diverting water from South Fork of Hunter Creek rather than from the Roaring Fork there will be benefits to fish and wildlife in the latter stream.

EFFECT OF DIVERSION ON COLORADO RIVER FLOWS WITHIN COLORADO

The Colorado Water Conservancy Act requires that in case of transmountain diversions built by any district created under the act the—

* * * works or facilities shall be designed, constructed, and operated in such a manner that the present appropriations of water, and in addition thereto, prospective uses of water for irrigation and other beneficial consumptive-use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the natural basin of the Colorado River in the State of Colorado, from which the water is exported will not be impaired nor increased in cost at the expense of the water users within said natural basin; and that the facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of, any project plans for the exportation of water from said natural basin in Colorado.

The Aspen Reservoir, to be built with a capacity of 28,000 acre-feet, is the facility which will accomplish the objectives set forth in the act. As a part of the project, it provides all of the replacement capacity required and, in addition, will supply certain natural shortages and contingent uses.

The replacement requirement represents the storage capacity necessary to replace to the stream, from water stored at times of surplus runoff, the amounts of water which would be diverted by the rehabilitated Independence Pass system and the Fryingpan-Arkansas collection system at times when such diversions would not be possible because of streamflows less than the demands at Cameo, a critical point, just above the Grand Valley diversion. The requirement to supply natural shortages for canals at Aspen is the amount of storage necessary, in addition to the above-mentioned replacement capacity, to furnish an ideal supply to those canals at times when natural streamflow would be below the ideal requirements.

A recheck of the operation of this reservoir was recently made by the engineering division of the Colorado Water Conservation Board. An analysis of the flows at Aspen and Cameo was also made to estimate the amounts of water which would be available in the Aspen Reservoir to take care of the drought seasons of 1934 and 1954.

Had the reservoir been in operation in 1933, it would have taken care of the replacement and natural shortage requirements for 1934 and would have refilled in 1935.

With regard to the 1954 season, the replacement and natural shortages would have been amply provided for.

The check studies conducted by the water board show that the average yield above diversion points will provide the 69,200 acre-feet for the project plus the amount necessary to make the Busk-Ivanhoe diversion of some 5,000 acre-feet. The low-water years of 1935 and 1954 would have been provided with an average flow by means of the reservoirs on the eastern slope which would have stored the above-average yields of the previous 2 or 3 years.

EFFECT ON COLORADO RIVER FLOW AT LEE FERRY

An analysis indicates that the historical flow of the Colorado River in the period 1931–40, the most severe drought period of record, would satisfy the lower basin obligation of 75 million acre-feet, and in addition produce a total of 26,500,000 acre-feet for the development of the upper basin. Stated in another manner: There would be, even under those extreme conditions, an annual average of 2 million acre-feet available during this period for upper basin development, and this after taking out an amount sufficient for the present and committed uses in Colorado.

What would be Colorado's total annual share of the water in the river during this period? The virgin flow would have been approximately 12 million acre-feet. Of this amount, 4,500,000 would be allotted to the upper basin under the 1922 compact and 2,330,000 would be Colorado's share under the upper Colorado River Basin compact. Uses, actual, 1,035,000 for agriculture (report of Engineering Advisory Committee, Colorado Conference Committee), plus 60,000 for historic transmountain diversions, and 587,000 for possible additional depletions by present and committee uses, give a total of 1,682,000 acre-feet. This amount subtracted from 2,330,000 leaves 648,000 acre-feet of uncommitted Colorado water. The Fryingpan-Arkansas project would require 75,000 acre-feet, including losses, or something over one-tenth of the uncommitted water.

If the analysis is based on the period 1934–53, a more favorable result is obtained. The annual virgin flow of the river at Lee Ferry during this period was approximately 13,709,000 acre-feet. The upper basin's share is 6,209,000, of which approximately 3,200,000 comes to Colorado. Actual uses are 1,035,000 for agriculture, plus 131,600 for historic transmountain diversions during the period, and 561,000 for possible additional uses by present and committed uses, or a total of 1,728,000. Uncommitted Colorado water is 3,200,000 less 1,728,000, or 1,472,000 acre-feet.

A report by the firm of Leeds, Hill & Jewett entitled "Depletion of Surface Water Supplies of Colorado West of the Continental Divide," based on the period 1930–52, states that "the present uncommitted surplus which can be relied upon for use in Colorado is thus 1,450,000 acre-feet per year." This independent study affords a rough check on the results given above.

Should Colorado receive its full allotment of 3,797,000 acre-feet, the uncommitted water would amount to 2,069,000 acre-feet.

Under the most adverse condtions, the Mexican Treaty might call for 390,000 acre-feet per year from Colorado's share of the river flow. Expert opinion is divided on this subject, some maintaining that this liability will never amount to half the quantity mentioned.

So from the standpont of the water supply, the estimates of the Bureau of Reclamation seem to be well in line, and they have been checked, and they have been rechecked by the engineering division of the Colorado Water Conservation Board.

I believe that is all I have to say.

Mr. ASPINALL. As I understand, the gentleman from the Third District of Colorado wishes to have the witnesses examined in groups. Is that right, Mr. Chenoweth?

Mr. CHENOWETH. That is right, Mr. Chairman.

Mr. ASPINALL. Mr. Crawford, the statement which you have presented to the members of the committee is practically the same as you presented a year ago in these hearings, is it not?

Mr. CRAWFORD. It is practically the same that Mr. Breitenstein presented a year ago, with the exception of the water supply statement at the end.

Mr. ASPINALL. Has there been any meeting of the Colorado Water Conservation Board since the date of February 22, 1951, which considered further the Fryingpan-Arkansas project?

Mr. CRAWFORD. Yes. On August 6 or August 8 of 1953, there was a communication from the Water Protective Association of Pitkin County stating, in effect, that this was not the same project that the water board had approved. That matter was brought to the attention of the board. Mr. Baston was called in from region 7 of the Bureau of Reclamation, and after consideration the director of the board was directed to reply to this in the effect that it was the same project, with the exception of a difference in cost attributable to several causes.

Mr. ASPINALL. Has the Colorado Water Conservation Board considered this matter further since the hearings held by this committee in 1954?

Mr. CRAWFORD. 1954. No, I think not.

Mr. ASPINALL. In other words, the position as stated in the statement which you have given to the committee still remains, unaltered,

the position taken by the Colorado Water Conservation Board heretofore?

Mr. CRAWFORD. That is correct.

Mr. ASPINALL. In your statement about the supply of water available you said the check was made at what gaging station?

Mr. CRAWFORD. We said the check was made first at the line of diversion and by means of gaging stations in the north fork at Norrie and on the main stream up in Glenwood Springs.

Secondly, the check was made at Cameo above Grand Junction and also the effect at Aspen.

Mr. ASPINALL. And how would you make the determination at Cameo when the water of the main stem of the Colorado River as well as the water of the Eagle River itself and other tributaries were entering the river at the same time? How did you differentiate between the waters coming in from the Roaring Fork and the Crystal and the other tributaries?

Mr. CRAWFORD. We have a gauging station at Glenwood Springs on the Roaring Fork. We knew the flow of the Colorado River at Cameo at the Roaring Fork and the amount that was diverted, taken out above the Roaring Fork, and by that means we were able to come to a conclusion with regard to the effect of this at Cameo, whether it would affect it.

Mr. ASPINALL. The water of the Roaring Fork and the Fryingpan is an appreciable part of the entire supply to which the State of Colorado is entitled out of the waters of the Colorado River under the compact, is it not?

Mr. CRAWFORD. Yes.

Mr. ASPINALL. If complete diversion of the Twin Lakes diversion and Fryingpan-Arkansas were made, it would amount to approximately one-thirtieth of the Colorado's total supply as far as the compact allocation of 7½ million acre-feet is concerned; is that right?

Mr. CRAWFORD. One-thirtieth?

Mr. ASPINALL. One-thirtieth.

Mr. CRAWFORD. That would be 110,000 acre-feet, 120,000 acre-feet, total of the 2. That would be 120,000 divided by whatever figure you put in the denominator—3,797,000 acre-feet.

Mr. ASPINALL. Is it the position of the spokesman for the Colorado authorities that in a year such as 1954 there would have been any water in the Roaring Fork and Fryingpan area for transmountain diversion under the Fryingpan-Arkansas project if the lower basin made the call for all of its water?

Mr. CRAWFORD. Leaving out of consideration the Mexican Treaty, or including the Mexican Treaty?

Mr. ASPINALL. You have to include the Mexican Treaty because it, too, is a part of the call on the river.

Mr. CRAWFORD. It is a little difficult to include the Mexican Treaty when you do not know what the demands will be from the Mexican Treaty.

Mr. ASPINALL. You know what the ultimate demand will be.

Mr. CRAWFORD. The maximum contingent liability will be 390,000 acre-feet, and there would have been, if there was storage on the Colorado River, even 10 years, for those 10 years, 1931 to 1940, there would have been an average of 650,000 acre-feet a year available as the uncommitted Colorado share of the water.

Mr. ASPINALL. You prefaced your remarks with "If there were storage on the Colorado River."

Mr. CRAWFORD. Yes.

Mr. ASPINALL. In other words, in a year such as 1934 or 1954 there would have been no water unless there had been storage facilities along the Colorado River itself or transmountain diversion on the Fryingpan-Arkansas; is that correct?

Mr. CRAWFORD. That might have been possible in 1934 and 1954. In 1954 there were 13,100 acre-feet of water available at the point of diversion to divert across the range in addition to the amount of water required by the operating principles to take care of the fish. Now this 650,000 acre-feet is uncommitted Colorado River, and I am not sure but there would have been that amount to send through the range in either one of those years according to our studies.

Mr. ASPINALL. Of course, you are assuming, Mr. Crawford, that the water would have been there if it had been generally available throughout the area of western Colorado. I am asking you a particular question as far as this watershed is concerned. This committee would like to know whether or not under existing conditions, without storage facilities on the main stem of the Colorado River, if there might not be years when there would not be any water for transmountain diversion under the Fryingpan-Arkansas legislation.

Mr. CRAWFORD. The result of our study shows there would not have been a year in which there would have been no water available for transportation across the range; that the previous year 1933 and 1953, and a year or two previous, there would have been sufficient water so that storage could have been built up in the Pueblo Reservoir on the eastern side of the range, and that it is not dependent upon storage on the western side to make the project feasible—each year.

Mr. SAYLOR. Will the chairman yield at that point?

Mr. ASPINALL. I will yield.

Mr. SAYLOR. Mr. Crawford, where is this storage to take place—on the west slope or on the east slope?

Mr. CRAWFORD. The storage that I am referring to is to take place on the east slope at three different points—the Sugar Loaf Reservoir, Twin Lakes Reservoir, and down in a reservoir to be constructed at Pueblo.

Mr. SAYLOR. But this whole project is predicated, is it not, upon the actual transmountain diversion annually of 69,000 acre-feet of water?

Mr. CRAWFORD. That is an average.

Mr. SAYLOR. That is an average?

Mr. CRAWFORD. In dealing with our water supply over 10-year periods, we deal with averages, so far as I know, and not maximums. Now you are leading into a matter which may be before the Supreme Court of the United States shortly for an interpretation of the Colorado River compact, and I do not think that I am in a position to follow into this too thoroughly.

Mr. SAYLOR. I am interested, because I have looked over this new bill, and I can nowhere in this bill see anything that says that the amount of water to be diverted in the Fryingpan-Arkansas project shall be on a 10-year average of 69,000 acre-feet. Can you point anything out in the bill that says that?

Mr. CRAWFORD. No; I do not know as I can point anything out in the bill that says that. However, I can point out there is a certain flow reserved for fish life and wildlife in the river, and I take for granted, if you can keep an average of 69,000 acre-feet, it would be permitted to take over, slightly in excess of that, in years when water was plenty.

Mr. SAYLOR. Have you discussed this matter with the Bureau of Reclamation?

Mr. CRAWFORD. No; I have not, sir.

Mr. SAYLOR. Then you do not know whether or not under any circumstances you would be permitted to a make a transmountain diversion in any one year of more than 69,000 acre-feet?

Mr. CRAWFORD. I probably know, sir; quite as well as the Bureau of Reclamation knows with regard to that point.

Mr. SAYLOR. Who is going to operate this facility?

Mr. CRAWFORD. As I told you before, this is a matter which in all probability will come before the Supreme Court in the case of Arizona versus California, and for an interpretation of what it means, of whether it means per annum or average.

Mr. SAYLOR. Regardless of what the Supreme Court decision in this matter is, I think this committee is entitled to know what the plans are of the Colorado Water Board with regard to the diversion of this river.

Mr. CRAWFORD. I think they have planned, or the understanding of the Colorado Water Board with regard to this is that there must be a certain amount of water go down that river to take care of fish life, and that there shall be an average diversion of 69,200 acre-feet per year.

Mr. SAYLOR. So that in some years you may take more water, and in other years you may take less?

Mr. CRAWFORD. Slightly, yes.

Mr. SAYLOR. What do you mean by "slightly"?

Mr. CRAWFORD. That will vary with the climate conditions. Probably might be from 5,000 to 10,000 acre-feet, or might be 3,000 acre-feet, but certainly not more than 8,000 to 10,000 acre-feet a year. That would be a variation in the yield. There might be a variation in the yield of that area.

Mr. SAYLOR. So that actually you might take out as much as 80,000 acre-feet in 1 year, or you might take out as little as 57,000 or 58,000 acre-feet?

Mr. CRAWFORD. That is correct.

Mr. SAYLOR. Now your figures of the amount of water that is available. How do you arrive at the demand which will be made as a result of the Mexican Treaty—the figure of 390,000 acre-feet?

Mr. CRAWFORD. That figure of 390,000 acre-feet is supposed to be 51.75 percent of 750,000 acre-feet, which is the liability of the upper basin, the same as the liability of the lower basin.

Mr. SAYLOR. Can you point out anything in the Mexican Treaty to this committee that says that the liability under that treaty allocates 50 percent of the charge to the upper basin and 50 percent to the lower basin?

Mr. CRAWFORD. No; but I think I can under the Colorado River compact.

Mr. SAYLOR. In other words, your interpretation of the demands of the Mexican Treaty are predicated upon the allocations made in the Colorado River compact; is that right?

Mr. CRAWFORD. The upper Colorado River compact—yes, the Colorado River compact.

Mr. SAYLOR. So that the position of the Colorado River Water Board is that Colorado can never be called upon to produce more than their proportionate share of a million and a half acre-feet annually; is that right?

Mr. CRAWFORD. That is approximately correct, yes.

Mr. SAYLOR. Suppose that you were completely erroneous and that the Mexican Treaty was not controlled by the Colorado River compact, as many of us sincerely believe. Then what would be the position of the Colorado River Water Board if a million and a half acre-feet would be demanded from any flow that is in the river?

Mr. CRAWFORD. I think, in the first place, that we would not consider that as possible of happening.

Mr. SAYLOR. We are basing it upon the assumption. In other words, your assumption is it is based on the Colorado River compact.

Mr. CRAWFORD. Yes.

Mr. SAYLOR. Now let us assume it is not based upon the Colorado River compact, because there are many legal authorities in this country that maintain that position.

Mr. CRAWFORD. I am not an attorney and I do not know the legal authorities that approve that assumption, and I think I would not care to testify with regard to that assumption.

Mr. ASPINALL. Will the gentleman from Pennsylvania take notice of the fact that I yielded to him out of order here.

Mr. SAYLOR. I will yield back.

Mr. ASPINALL. There is one more question, Mr. Crawford. As I understand it, it is the position of the Colorado authorities that they will do their part to see that the operating agreement or the operating principles which were approved by the Colorado Water Conservation Board on February 2, 1952, shall be lived up to as far as any of their authority is concerned. Is that correct?

Mr. CRAWFORD. In strict detail, yes.

Mr. ASPINALL. The Chair recognizes the gentleman from New York, Mr. O'Brien.

Mr. O'BRIEN. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from Nebraska, Dr. Miller.

Dr. MILLER. I was not here to listen to your testimony today. But, as I understand it, the water that is now under consideration for the Fryingpan-Arkansas project is a part of the water that belongs to the upper Colorado River group, and a compact has been made as to the distribution of that water that Colorado gets and the percentage other States get. Is that true?

Mr. CRAWFORD. That is correct.

Dr. MILLER. And the thing that you are trying to do now is, under that compact, make some disposition of the water that belongs to——

Mr. CRAWFORD. The State of Colorado.

Dr. MILLER. The State of Colorado?

Mr. CRAWFORD. Correct, sir.

Dr. MILLER. Is there anything wrong with that?

Mr. ASPINALL. The Chair recognizes the gentlewoman from Idaho, Mrs. Pfost.

Mrs. PFOST. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. Again, Mr. Crawford, let's get back to the position or what is going to be the position of the Colorado River Water Board.

Mr. CRAWFORD. The Colorado Water Conservation Board. There is a board called the Colorado River Water Board, and for that reason I would like to use an exact term.

Mr. SAYLOR. All right, sir. We will be glad to use the exact term—the Colorado Water Conservation Board.

Mr. CRAWFORD. Check, sir. Thank you.

Mr. SAYLOR. Now, as a director and as an expert in water matters, what would be the position of Colorado if the entire demand of 1,500,000 acre-feet annually should be made upon the waters of the Colorado River wherever they are found?

Mr. CRAWFORD. I do not understand what you mean by "Wherever they are found." The million five hundred thousand acre-feet, it is my understanding, is at the Mexican boundary.

Mr. SAYLOR. That is right. Now it is the first charge on the river.

Mr. CRAWFORD. In regards to quantity, but not necessarily with regard to quality.

Mr. SAYLOR. Quantity but not necessarily quality?

Mr. CRAWFORD. Yes.

Mr. SAYLOR. Suppose there is not enough water to supply any more than a million and a half acre-feet and that is all comes from Colorado, it all comes from this fork of the river. Then where are you going to get the water to divert?

Mr. CRAWFORD. We cannot entertain such an assumption.

Mr. SAYLOR. Why can you not? You are basing a lot of your answers here upon assumptions.

Mr. CRAWFORD. No.

Mr. SAYLOR. Well, you have just said you based them on assumptions, and they are assumptions that lawyers who represented you have made. Now the question I am asking you is: Suppose those assumptions are not correct. Do you want to come before this committee and tell me as a man who is experienced in water matters that you cannot now change your position and tell us what it would be?

Mr. CRAWFORD. I cannot tell you what the board would be, not the position of the board or the position of the attorneys for the board.

Mr. SAYLOR. Can you tell us what your position would be?

Mr. CRAWFORD. What is that?

Mr. SAYLOR. Can you tell us what your position would be?

Mr. CRAWFORD. I just told you that I could not consider such an assumption, that I do not think it is valid in any way.

Mr. SAYLOR. Whether it is valid or not, why can you not consider it? You have considered only—the important thing, Mr. Crawford, as I gather it, is this: You have come here and want to present to this committee only the assumptions that the Colorado Water Conservation Board wants to make.

Mr. CRAWFORD. I would not say they are assumptions, sir. I do not want to get contentious about this in any way, but we based our

case here on physical facts of the Colorado River compact and upper Colorado River compact and the Mexican Treaty, as we understand it.

Mr. SAYLOR. As you understand it?

Mr. CRAWFORD. Yes.

Mr. SAYLOR. All I am asking you is, suppose your understanding is incorrect, and suppose what you have assumed is completely erroneous, and that instead of only being required to furnish 390,000 acre-feet, Colorado is required to furnish a million and a half acre-feet.

Mr. CRAWFORD. I do not see there is any possibility of that happening.

Mr. SAYLOR. Whether there is any possibility of it or not, I am asking you what the position of Colorado would be.

Mr. CHENOWETH. Will the gentleman yield?

Mr. CRAWFORD. The position of Colorado, I am very sure, is that that could not happen.

Mr. SAYLOR. Well, it can happen, Mr. Crawford, just as well as any of the assumptions which your board has assumed, because your board and your attorneys have come to an assumption that you are only subject to that portion of the Mexican Treaty burden which is related to the Colorado River compact. Now there are attorneys that have studied those matters who disagree violently with that conclusion, and representatives of the Federal Government that disagree violently with that conclusion.

Mr. CRAWFORD. I claim no competence so far as the law is concerned, and I do not think that I should be required to answer your question based upon legal controversy, legal opinion.

Mr. CHENOWETH. Will my colleague yield?

Mr. SAYLOR. Sure.

Mr. CHENOWETH. Is it not a fact, Mr. Crawford, that you are here today telling this committee that the Colorado Water Conservation Board has approved this project, and certainly you would not approve a project unless the water was available, would you?

Mr. CRAWFORD. No.

Mr. CHENOWETH. And is it not also a fact that in very few years over the past, say, 25 years the water for the full diversion has not been available?

Mr. CRAWFORD. Very few.

Mr. CHENOWETH. How many, would you say?

Mr. CRAWFORD. Perhaps 3 or 4.

Mr. CHENOWETH Three or four years in the last 25 years.

I wish you would do what you can to assure my distinguished colleague and friend from Pennsylvania that the water is available and that these assumptions and fears and doubts which he has expressed can be removed.

Dr. MILLER. Will the gentleman yield to me?

Mr. SAYLOR. Surely.

Dr. MILLER. Of course, the gentleman is a splendid lawyer and a prosecuting type of lawyer. I enjoy sitting beside him and watching the agility of his mind. Why do you not place a hypothetical question before the gentleman—if the water should dry up in the Colorado River, whether they would expect to get any water. It might have just as much foundation as the approach you are taking now, because the water, I think, is going to continue to run in the Colorado River.

But just for a hypothetical question, you might ask what he would do if the water just dried up in the Colorado River.

Mr. SAYLOR. Now, Doctor, I appreciate your compliments and thank you for the kind things you have said, but I refuse to have this reduced to an absolute absurdity, which you are attempting to do.

Dr. MILLER. You are on the border of doing the same thing.

Mr. SAYLOR. I am not. In other words, I am only asking the gentleman, because there is a conscientious and profound difference of opinion among the lawyers, as to where the burden of the Mexican Treaty lies.

Mr. ASPINALL. The Chair would suggest that the gentleman from Pennsylvania continue with his questions.

Dr. MILLER. Thank you for yielding.

Mr. SAYLOR. The next question I would like to ask you, Mr. Crawford: Here some time ago we had some hearings on a project affecting your great State, known as the upper Colorado River storage project and participating projects. At that time the representatives of the western slope appeared before this committee and said that the present uses and the future potential uses in the western slope were sufficient to consume all of the waters to which Colorado was entitled under the allocation under the Colorado River compact. If that assumption is correct, why should this transmountain diversion be authorized?

Mr. CHENOWETH. Will the gentleman yield right there?

Mr. SAYLOR. No.

Mr. CHENOWETH. I want to keep the record straight.

Mr. ASPINALL. Let us proceed in order. The gentleman from Pennsylvania does not wish to yield; he is under no compulsion.

Mr. CRAWFORD. I did not hear you, Mr. Chairman.

Mr. ASPINALL. The reporter will read the question.

(The record was read by the reporter.)

Mr. CRAWFORD. Really, I suppose there are two answers that will bear on that. No. 1 is that those folks from the western slope of Colorado from over there have agreed, and agreed in 1950, that this transmountain diversion should take place. And the No. 2 answer is that the water does not belong to any particular group of citizens within the State of Colorado; it is the property of all of the citizens within the State of Colorado regardless of what slope they happen to come from.

Mr. SAYLOR. So that it is your position that the Colorado Water Conservation Board, therefore, has authorized you to appear and support this transmountain diversion even though all of the water could be put to beneficial consumptive use in the western slope?

Mr. CRAWFORD. Yes, on account of an agreement, on account of the western slope folks, both the Colorado River Water Conservation Board, and the Southwestern Conservation Board agreed, and they are both western slope organizations, agreed to approve this diversion.

Mr. SAYLOR. One of the big units of this project is the Twin Lakes project; is that right?

Mr. CRAWFORD. An enlargement of the Twin Lakes Dam, yes, Reservoir.

Mr. SAYLOR. Right. Who owns the Twin Lakes Dam?

Mr. CRAWFORD. That is owned by a group of irrigation farmers down below Pueblo. I have forgotten. The Twin Lakes Irrigation

Co., I believe, is the title and the name of the concern, although I am not sure.

Mr. SAYLOR. Who owns the stock in it?

Mr. CRAWFORD. Individuals composing that irrigation district.

Mr. SAYLOR. There is another storage project which you intend to enlarge; is that correct?

Mr. CRAWFORD. Yes, I think it is the Sugar Loaf.

Mr. SAYLOR. Who owns Sugar Loaf?

Mr. CRAWFORD. I think the Colorado Fuel & Iron Co., or they did at one time. I am not sure whether that ownership has been transferred recently or not.

Mr. SAYLOR. How much money will be spent on the enlargement of these two projects?

Mr. CRAWFORD. I am not sure. I do not have those figures in my mind.

Mr. SAYLOR. That is all.

Mr. ASPINALL. The Chair recognizes the gentleman from Oklahoma, Mr. Edmondson.

Mr. EDMONDSON. Mr. Crawford, I would just like a little general information. Are you presently using the waters of the Arkansas River for all types of purposes including municipal and some domestic consumption?

Mr. CRAWFORD. Yes. The city of Pueblo derives its supply principally from the Arkansas River.

Mr. EDMONDSON. Does that water have any appreciable saline content there in that area?

Mr. CRAWFORD. It does. It varies at different stations along the river, different places along the river, but it does have some. However, at no place is it sufficient to make it unsuitable for irrigation purposes.

Mr. EDMONDSON. Is there any place along it where it is unsuitable for human consumption?

Mr. CRAWFORD. Yes; lower down on the river, unless treated carefully, it is not suitable for human consumption.

Mr. EDMONDSON. Will this be a better quality of water that will be brought into this project for that valley?

Mr. CRAWFORD. Yes. There is 70,000 acre-feet from the western slope which will be a much better quality.

Mr. EDMONDSON. I see. Do you anticipate bringing in this 70,000 acre-feet will reduce appreciably the use of the Arkansas River water that is made in that area?

Mr. CRAWFORD. When it comes to a matter of using it for municipal purposes, it will be brought down in a pipe alongside of the river rather than flowing and commingling with the somewhat inferior waters of the river.

Mr. EDMONDSON. And in certain uses of the Arkansas River water, it will displace Arkansas River water; will it not?

Mr. CRAWFORD. Yes.

Mr. EDMONDSON. I think that is all I have.

Mr. ASPINALL. The Chair recognizes the gentleman from New York, Mr. Pillion.

Mr. PILLION. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Sisk.

Mr. SISK. Mr. Chairman. Mr. Crawford, do I understand that the greater portion of the 70,000 acre-feet of water to be diverted will come from floodwater and will not materially affect the natural and normal flow of any stream on the western slope?

Mr. CRAWFORD. Practically all of that water will come from floodwater; yes.

Mr. SISK. It will be an accumulation of floodwaters?

Mr. CRAWFORD. Yes.

Mr. SISK. That is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

Mr. CHENOWETH. I just want to clear up a couple of things, Mr. Crawford, relating back to the question of Mr. Saylor concerning the use of this water in Colorado and on the western slope. Is it not a matter of fact that the western slope water users have agreed with the eastern slope water users on this diversion?

Mr. CRAWFORD. Yes.

Mr. CHENOWETH. And their rights are fully protected by the construction of the Aspen Dam?

Mr. CRAWFORD. That is correct.

Mr. CHENOWETH. And the Aspen Dam shall be constructed before any water is diverted?

Mr. CRAWFORD. That is correct.

Mr. CHENOWETH. I wanted to keep the record straight.

That is all.

Mr. ASPINALL. The Chair recognizes the gentleman from Florida, Mr. Haley.

Mr. HALEY. The gentleman from Florida has no questions.

Mr. ASPINALL. Thank you very much, Mr. Crawford.

At this time the Chair would ask unanimous consent to have made a part of the record at this place a letter from the Governor of Colorado, the Honorable Edwin C. Johnson, with regard to the project. Are there any objections?

Hearing none, it is so ordered.

(The letter referred to follows:)

STATE OF COLORADO,
EXECUTIVE CHAMBERS,
Denver, May 4, 1955.

SECRETARY OF THE HOUSE INTERIOR COMMITTEE,
House of Representatives, Washington, D. C.

SIR: I want this record to show my whole-hearted support of H. R. 412 and S. 300.

The Fryingpan-Arkansas project is of vital importance to the Arkansas River Basin of Colorado.

Many will stress the importance of this great water diversion program to take care of a growing population and an expanding economy. And every word they say will be true. This basin cannot progress without supplemental water. I stress supplemental. The have almost enough water normally to produce excellent crops and supply their domestic needs but "almost enough" is almost as great a tragedy as none at all.

Fryingpan-Arkansas water is needed not alone for the progress of the future; it is needed for survival now. The Arkansas River Basin of Colorado is in the Nation's hardest hit drought area. Water transfusion is necessary to the very lifestream of this region. Farmers must have more water to produce; industry to stay in business; citizens to exist.

In times such as the present, it is not only a tragedy but a downright sin to waste even a drop of water. The Fryingpan-Arkansas will conserve and utilize

water to the very best advantage, such as has never been done before. Through proper conservation and use, both the western and eastern slopes will have more water. Control of floods and sedimentation will be more effective.

Through such conservation, not a single drop of water will be taken from anyone else. It all will come from Colorado's rightful share of Colorado River water. Up to the present, Colorado has not been getting her share.

The Fryingpan-Arkansas will also add greatly to the economy of the West and all the Nation. It is more than a self-liquidating project. As has been pointed out many times, 86 percent of the investment will be repaid, nearly all of it with interest. And there are many additional benefits to the Nation's prosperity and security. You will have the incontrovertible proof in statistics from others which will tell a most impressive story.

As Governor of Colorado, I want to emphasize further that the Fryingpan-Arkansas project is not only good business for both our State and Nation, it is necessary business if the Arkansas River Basin is to survive and thrive.

Support comes from all who recognize a sound investment in prosperity and security when they see it. Opposition is but the voice of the selfish few who I fear do not know whereof they speak.

Sincerely yours,

ED. C. JOHNSON.

Mr. ASPINALL. The Chair sees that we have with the committee this morning Hon. Gordon Allott, United States Senator from Colorado. We shall be very glad to listen to you this morning, Senator Allott, if you have a statement.

STATEMENT OF HON. GORDON ALLOTT, A UNITED STATES SENATOR FROM THE STATE OF COLORADO

Senator ALLOTT. For very obvious reasons, ladies and gentlemen, I have not brought with me a prepared statement to introduce into the record. I have introduced and made such a statement in the hearings of this project when it was being heard before the Interior and Insular Affairs Committee of the Senate, and that is already a part of the record, and to repeat it would simply encumber the record.

I do want to make this statement: That, having lived all of my life in southern Colorado, having been born in Pueblo, Colo., and raised there, and having lived in Lamar, Colo., which is on the eastern reaches of the Arkansas River, for 25 years, and having participated during all of that time in considerable irrigation and drainage matters in connection with the farmers of that area, I feel that I am somewhat acquainted with the situation. I merely want for the purposes of the record to make it straight that I am here unqualifiedly in support of this project, and to tell you how much and how badly this is needed and how vital it is to the continued development of Colorado.

I think that concludes my statement, sir. Thank you very much.

Mr. ASPINALL. We are glad to have you here, Senator, and any time during the hearings you wish to be a part of the committee we shall be glad to welcome you.

Senator ALLOTT. Thank you very much, sir.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth, to introduce our next witnesses.

Mr. CHENOWETH. Mr. Chairman, our next group of witnesses is a group representing the farming and agricultural interests of the Arkansas Valley.

Before I present them, Mr. Chairman, may I inquire now as to the program of the committee?

Mr. ASPINALL. The Chair has been advised by the chairman of the full committee that we shall be able to meet this afternoon from 2 o'clock until 4. So, if you wish to present your witnesses in groups, it will be satisfactory.

Mr. CHENOWETH. I was going to inquire as to the questioning of these witnesses.

Mr. ASPINALL. I would suggest, if we are going to have this afternoon, you present them as farmers, city representatives, utilities, REA's, and so forth, and question them en banc on those particular matters.

Mr. CHENOWETH. I was going to ask whether we were going to do that questioning this morning or this afternoon.

Mr. ASPINALL. We will question this morning.

Mr. CHENOWETH. Mr. Chairman, I am pleased to present the next group of witnesses, which consists of Mr. Roy Cooper, Las Animas, Colo., a farmer in that area; Mr. Ted Ryan of Rocky Ford, Colo., a farmer in that area, both of whom have testified previously before this committee in support of this project; Mr. George Everett of Salida, Colo., a farmer in that area; and the last of the four, Mr. Everette Marshall of La Junta, Colo., one of our prominent farmers and feeders. In addition to that, Mr. Chairman, I would like to call the committee's attention to the fact that Mr. Everette Marshall is the former heavyweight wrestling champion of the world. I believe he holds the championship belt. He will always be world's champion in Colorado.

I am happy to present this group to you.

Mr. ASPINALL. If the gentleman will yield, I would like to include that Mr. George Everett is from my Congressional District.

Mr. CHENOWETH. I should have mentioned that, Mr. Chairman.

Mr. ASPINALL. You gentlemen may proceed and make your statements. We will hear Mr. Everett first.

STATEMENT OF GEORGE E. EVERETT, SALIDA, COLO.

Mr. EVERETT. Thank you, Mr. Chairman.

As the honorable judge has stated, we four farmers represent the farmers and ranchers throughout the Arkansas Valley.

For the purpose of identification I, George E. Everett, would like to state that I was born and raised in Chaffee County, as was my father before me. My grandmother came to the county as a child. Her parents homesteaded within the area in the late 1860's. I am the fourth generation that has continually engaged in livestock and agricultural production within the county since that time. I am a member of the Farmers' Union, the Chaffee County Cattlemen's Association, the Colorado Cattlemen's Association, and I am a member of the school board of Adobe Park School, as well as being a member of many other organizations.

The area here under consideration which is utilized for agriculture and grazing ranges in elevation from 5,330 feet above sea level to 10,500 feet above sea level, with the watershed extending on to 14,400 feet above sea level, consisting of 1,670 square miles of drainage area, of which 6,700 acres are under irrigation and the balance is mountain meadow pasture and dryland pasture. The crops of this area consist of general agricultural crops such as mountain-meadow hay, alfalfa,

barley, wheat, and oats. These crops are used in production of livestock. The livestock raised is principally feeder cattle, feeder lambs, and purebred breeding stock.

The livestock industry at present is largely dependent on State and Federal forest lands for summer grazing, with winter feed being raised on the irrigated lands for the breeding herds during the winter months.

Shortage of irrigation water, causing decreased feed supplies, has resulted in excessive grazing of the private rangelands within the area, as well as excessive demands on the State and Federal lands for grazing purposes.

A supplemental water supply would result in the planting of more irrigated pasture, increased production of hay, and increased yields of oats, wheat, and barley.

Detailed farm budgets prepared for this area under a cooperative study sponsored by the Southeastern Colorado Water Development Association have shown that loss in gross crop sales varies from $13.33 to $22.57 per acre. Assuming that $15 per acre would represent a conservative average the total loss in crop sales could well amount to $1 million per year.

The Fryingpan-Arkansas project, creating additional water, will make possible the reorganization of many of the ditch system now existing in this area. To illustrate this point, during the irrigation year 1942 there was approximately 255,000 acre-feet of water diverted in water district 11, which includes Lake and Chaffee Counties.

On the average 50 percent of the water is lost in the ditches before it reaches the land where it is to be applied. This means that 127,000 acre-feet of water is lost, so far as crop production is concerned. A very conservative estimate would show that approximately 20,000 acre-feet of this water can be saved as a result of water exchanges, consolidation of innumerable small ditches, and utilization of the project canals as a transportation facility. These savings are dependent entirely on the agreements among the irrigators and the Bureau of Reclamation where their facilities are involved.

Construction of this project will stimulate production of intensive agricultural crops and dairy products during the construction period. It is realized that this is only temporary and is not considered in estimating the agricultural losses accruing in the area.

It is my opinion that this project is of vital importance to the entire Arkansas Valley and should be authorized and completed as soon as possible.

Mr. ASPINALL. Does that complete your statement?

Mr. EVERETT. Yes. Thank you, sir.

Mr. ASPINALL. The next witness will be Mr. Marshall. We are glad to have you here. I will assure this committee that Mr. Marshall is just as good a farmer as he was a wrestler. That means he is the world champion in farming also.

STATEMENT OF EVERETTE MARSHALL, LA JUNTA, COLO.

Mr. MARSHALL. Mr. Chairman, you are giving me an awful lot to live up to.

I am Everette Marshall, of La Junta, Colo.

My business is farming and feeding cattle. I started buying property in Colorado in 1930 in the immediate vicinity of La Junta. I

came home to take over my holdings personally in 1938 and since then have built up my cattle feeding any my holdings until I am farming better than 2,000 acres and feeding out from 12,00 to 20,000 head of cattle per year. Most of these cattle are butchered and prepared for market in Pueblo, Colo., and shipped to retail outlets in the East.

My operations are similar to many others in the West who feed cattle for the eastern markets. With the best quality range cattle, and the best feeds obtainable, the best quality beef is produced for the American consumer. The cattle that I feed come from the grass ranges of Colorado, Kansas, New Mexico, Texas, and Oklahoma.

After these cattle get into my lots, then my operations involve my neighbors. I have been buying feed since 1938. My neighbors farm and receive their water from the Catlin and Rocky Ford ditches whose water rights go back beyond 1874. The farms of thse neighbors will vary in size from 80 acres to approximately 600 acres. They are the ones upon whom I depend primarily in providing the necessary feed such as corn, milo, alfalfa hay, beet pulp, and green ensilage. In spite of the fact that these farmers have ditches with early water rights, they are not only confronted by the hazards of hail and insects, but they must confront drought as in 1954 and 1955.

As an example of how all of our operations are integrated, may I recite the following figures:

In 1954 and 1955, we fed and will feed approximately 18,000 head of cattle. In order to supply the feed for them, it was necessary to truck it in from such distances as Nebraska, western Kansas, and other areas which have not been so hard hit by the drought. This means that the neighbors, whose life savings are invested in the farms which produce the feed for these cattle, will suffer greatly. In feeding 18,000 head of cattle, we would normally purchase approximately $1,860,000 worth of feed.

In 1954 and 1955 these neighbors will probably not be able to furnish more thon one-third what they normally could under average conditions. The effect on the local economy is disastrous. In addition to the suffering from the drought, these neighbors' farms are also subject to infestations and hail periodically. Therefore, anything which can partially alleviate one of the hazards, such as proposed under the Fryingpan-Arkansas project, will reduce the risks tremendously. If a farmer has water for irrigation at the times it should be put on the crops, he can withstand practically all of the other hazards without too much difficulty. By the way, we have a growing season of 173 days average in the Arkansas Valley, with long hot spells in midsummer which really makes crops, if water is available.

Irrigation is a matter of timing. We must have water to start the crops, to carry them along during the summer, and mature them in the fall. This means the difference between a harvest, or a loss of all the seed and labor invested in those crops. For that reason the average cost of $5.40 per acre-foot is cheap crop insurance.

The investment in seed and labor each year by my neighbors and myself will range from $50 to $200 per acre. This does not include the large investments in buildings and machinery. We have an average of 20 families on full-time employment for the purpose of

forming and feeding the cattle. As for me, I can buy feed elsewhere in order to carry on my feeding operations, but the disastrous part of the whole situation is that the farmer who is confined to trying to produce crops from his land is left holding the bag whenever drought hits him because he cannot go elsewhere to carry on his operations.

The grains and feed which are grown in the Arkansas Valley through irrigation do not enter into the surplus crop problem which affects other parts of the country. The quality of the grains and feed are recognized by such major outfits as American Stores and also by Ralston Purina, which built a large alfalfa processing mill at La Junta which feeds from 18,000 to 25,000 tons of alfalfa per year in order to produce rabbit pellets alone. These pellets will have from 1½ to 2 percent more protein from the natural hay than is produced elsewhere.

There are other commercial establishments which have located in the Arkansas Valley because of the excellence of the farm products. There are many others which would like to locate there if they could be assured of a more stable annual production of crops which would permit them to operate economically from year to year.

Hay today in the Arkansas Valley, which was selling for $30 a ton, has jumped to $40 and $50 and is not always obtainable at that price.

The quality of water available for cattle means much in the way they gain in the feed lots. Poor water can be a great detriment because of the hardness and salts. But good water such as may be provided through the proposed municipal valley pipeline could mean as much as 10 cents a day gain on cattle. In addition to the value of the improved quality of the domestic supply through the pipeline, reregulation of the river and storage in upstream reservoirs would serve to make the flow downstream less hard and of better quality. This would be of great benefit to the farmer who irrigates as well as the feeder.

In summary, it should be apparent that the water supply under the Fryingpan-Arkansas diversion project holds the key to the agricultural economy of the Arkansas Valley.

The cost of the water to the farmer under the project at an average of $5.40 per acre-foot is the cheapest crop insurance a farmer could hope to purchase.

The experiences of the last 2 years of drought, plus the great fluctuations of water in the Arkansas River in more normal years have cost the farmers many millions of dollars in crop loss during the past 15 years.

When farmers and cattle feeders are prosperous, they spend their money to buy manufactured goods from the East, which in turn affects the entire economy of the Nation and proves to be of great benefit to the Nation as a whole.

Mr. ASPINALL. That completes your statement?

Mr. MARSHALL. Yes.

Mr. ASPINALL. Who has the next statement?

Mr. COOPER. I do.

Mr. ASPINALL. You may proceed.

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STATEMENT OF ROY D. COOPER, LAS ANIMAS, COLO.

Mr. COOPER. I, Roy D. Cooper, live 6 miles northeast of Las Animas, Colo. I was born on this irrigated farm 41 years ago. I have carried and used an irrigation shovel ever since I was big enough. I operate 720 acres of irrigated land. On the average, I feed 3,000 lambs and 300 steers annually.

For the past 10 years I have been a member of the board of directors of the Fort Lyon Canal Co. which is one of the largest, if not the largest, irrigation systems in Colorado.

The section of the main stem of the river between La Junta and Lamar has approximately 100,000 acres of irrigated land. It is made up of three separate irrigation systems, namely, Las Animas consolidated canal, Las Animas town ditch, and the Fort Lyon Canal. The Las Animas town ditch has no water shortage due to an early priority and small limited acreage. The Las Animas consolidated ditch and the Fort Lyon Canal have approximately equal shortages and crop similarities. Of the three above-mentioned systems, the Fort Lyon Canal has approximately 90 percent of the total acreage; and also has approximately 30 percent of the total acreage of the main stem of the Arkansas Valley which is irrigated. Using the Fort Lyon Canal data as a basis to compile the following figures and statements, would in turn be an approximate picture of this entire section.

FORT LYON CANAL SYSTEM

This system comprises the Fort Lyon Canal, Fort Lyon storage canal, Horse Creek supply canal, Adobe Creek supply Canal, Horse Creek Adobe Creek Reservoirs.

The Fort Lyon storage canal, Horse Creek supply canal and Adobe Creek supply canals are feeder canals for Horse Creek and Adobe Creek Reservoirs.

Water stored in the above reservoirs is released through outlet ditches to the Fort Lyon Canal which is the distribution canal for the system. This canal diverts water from the Arkansas River approximately 3 miles west of La Junta, Colo., on the north side of the river at a location known as the point of rocks and runs in a northeasterly direction for 105 miles to its terminus which is 7½ miles north and 2 miles east of Lamar, Colo., and irrigates 93,000 acres which comprise 419.18 farm units.

PRINCIPAL CROPS

These crops are alfalfa, corn and cereals. A limited acreage of onions, potatoes, and sugar beets are grown each year, but generally on land where underground water is available for pumping. During a part of the growing season, the supply in the Fort Lyon Canal is so short that water cannot be supplied often enough for growers of onions, potatoes, and sugar beets to produce the best results, unless storage water is available.

WATER SUPPLY

The flow of the Arkansas River available for the Fort Lyon Canal is very erratic. During the greater portion of the year, the first decree of 165 feet is diverted. The second and third decrees, which

make a total of 933 second-feet, are only available during the period of snow runoff from May 15 to July 1 and at times of heavy rainfall over the drainage basin above the Fort Lyon Canal. During the summer months, the river is subject to sudden rises of short duration from rain and during these periods the river-flow at the Fort Lyon headgate may vary from several thousand to ten to fifteen thousand second-feet.

Due to the erratic flow into the Fort Lyon Canal, the farmers apply more water than necessary during periods of high flows in the canal, because they do not know when the supply will diminish.

If the supply of the water to be diverted could be controlled by a reservoir upstream, it would be possible to make a more efficient use of the water.

The following table is composed of figures and data kept by the Fort Lyon Canal system. The table gives the yearly diversions, the gross duty based on the present irrigated acreage, and the total yearly shortages in acre-feet on the assumption of a gross duty of 3 acre-feet for the acreage irrigated under the canal.

As used herein, the gross duty is the total amount diverted from all sources (river and water from storage). In compiling the following table, it does not take into consideration any transmission losses in the main canal or laterals from it, or temperature losses, or variations in precipitation.

The average annual shortage in years of normal precipitation based on a gross duty of 3.0 acre-feet amount to 70,000 acre-feet which if available would give this system a firm, controlled water supply.

A glance at the table will show that during the period from 1931 to 1941, inclusive, the diversions were extremely low. This period is known as the Dust Bowl period.

This table also shows the necessity for additional water for this system and the controlling of the same by storage upstream.

Fort Lyon Canal system

	Total amount diverted in acre-feet for irrigation	Gross duty acre-feet for 93,000 acres irrigated	Total shortage in acre-feet based on 3.0 acre-feet gross duty for 93,000 acres		Total amount diverted in acre-feet for irrigation	Gross duty acre-feet for 93,000 acres irrigated	Total shortage in acre-feet based on 3.0 acre-feet gross duty for 93,000 acres
1916	250, 395	2. 69	28, 605	1935	200, 685	2. 16	78, 315
1917	216, 708	2. 33	62, 292	1936	232, 119	2. 50	46, 881
1918	229, 574	2. 47	49, 422	1937	182, 470	1. 96	96, 530
1919	266, 977	2. 87	12, 023	1938	236, 480	2. 54	42, 520
1920	286, 560	3. 08	[1] 7, 560	1939	143, 079	1. 54	135, 921
1921	191, 779	2. 06	87, 221	1940	104, 013	1. 12	174, 987
1922	224, 453	2. 41	54, 547	1941	250, 662	2. 69	28, 338
1923	193, 135	2. 08	85, 865	1942	265, 724	2. 86	13, 276
1924	227, 376	2. 44	51, 624	1943	215, 613	2. 32	63, 387
1925	181, 286	1. 95	97, 714	1944	218, 881	2. 35	60, 119
1926	218, 377	2. 35	60, 623	1945	218, 449	2. 35	60, 551
1927	208, 987	2. 26	69, 013	1946	209, 793	2. 26	69, 207
1928	230, 826	2. 48	48, 174	1947	245, 792	2. 64	33, 208
1929	248, 471	2. 67	30, 529	1948	263, 314	2. 83	15, 686
1930	236, 214	2. 54	42, 786	1949	252, 246	2. 71	26, 754
1931	154, 728	1. 66	124, 272	1950	230, 681	2. 48	48, 319
1932	163, 771	1. 76	115, 229	1951	208, 968	2. 25	70, 032
1933	203, 251	2. 18	75, 749				
1934	100, 673	1. 08	178, 327	Average		2. 28	66, 960

[1] Overage.

During the years 1951, 1952, and 1953, a committee of farmers in cooperation with the Bureau of Reclamation made a detailed grass-roots survey of potential crop productions on the assumption that the F. P. A. project was in operation. Ten farmers on each ditch were contacted and many meetings were held with these men. Each farmer made a detailed analysis of his personal operations, irrigation practices, acreages in crops, prices, markets, potential crops, and many other factors. This was continued ditch by ditch until the entire irrigated acreage of the Arkansas Valley had been analyzed.

These surveys are represented by the maps I have here whereby each ditch as well as the name of each farmer is specified therein. I would like to offer these maps, and I request, Mr. Chairman, that the maps be made a part of the record of these proceedings.

Mr. ASPINALL. Without objection, the maps will be made a part of the file and not a part of the record.

(The maps referred to will be found in the files of the committee.)

Mr. COOPER. Under the Fort Lyon Canal system, 30 farmers of average crop-production ability were interviewed individually. A comparison was made of acreages and yields under present water conditions with supplemental water conditions based on an average price range of the period from 1939 to 1944, inclusive.

The data showed that a lack of adequate water caused a gross loss of $24.24 per acre, or a net loss of $10.72 per acre. Over the entire system, this would show a gross loss of $2,013,319.29, or a net loss of $890,481.26 per annum.

The difference of $1,222,838.03 is a direct loss of income to the community in the form of labor, machinery, and supplies. Also, the increased activity created within the community by additional water would create a more stable and year-around economy which is impossible to measure in dollars and cents. Much of the losses I have mentioned can be avoided by the Fryingpan-Arkansas project.

This survey showed there would be an increase in diversified crops such as onions, beets, potatoes, and tomatoes. These crops show a higher net loss per acre due to the shortage of water. For example, the average gross income from an acre of alfalfa is $59.30; from that of an acre of onions, it is $575. This shows a difference of $515.70. With a meager 1-percent increased acreage of one of these diversified crops, such as onions, there would be an approximate increase of 830 acres, which would gross $477,250, or approximately one-half million dollars. Since this locality has ideal climatic and soil conditions to raise these diversified crops, it is a shame this terrible loss exists due to the shortage of available water.

It is also true that there is as high as a 50-percent loss on certain crops that require the entire climatic growing season of this section of the country to produce a crop. These crops may be held back 30 to 50 days early in the spring due to a lack of water or retarded 30 to 50 days at the end of the season from the lack of water. That condition exists under the present water supply; for example, alfalfa should yield on the average $59.30 per acre, which in a dry time takes a 50-percent loss, amounting to $29.65 per acre. This multiplied by the total acreage of 37,056.27 shows a gross loss of $1,098,727.41. Figuring corn, sugarbeets, and barley in the same way, the resulting losses are: Corn, $380,585.90; sugarbeets, $184,086; barley, $88,155.25.

Fort Lyon records, 1916–52, show approximately a 30-percent loss

of storage water by seepage through long storage canals and by evaporation from shallow storage basins in this plains area of hot and arid climate. If all water available could be stored upstream, data shows the 30-percent loss could be decreased to 1 percent. The Fryingpan-Arkansas project would make this saving possible.

It is very difficult to actually measure the value of winter irrigation. At the present time, winter water is applied on ground that has been plowed in the fall and is very hard and cloddy. It does not carry carry enough moisture to freeze and mellow down so it can be worked into a good seedbed in the spring. If we had additional water in the late summer, this fall-plowed ground would carry enough moisture for freezing and thawing and would be in good condition without winter irrigation. Also, we now have to water perennial crops in the wintertime so they have sufficient moisture to start their growth early in the spring. If they had sufficient water late in the summer or early fall, they would not need to be irrigated during the wintertime. So it is my belief that if we had additional water for late summer or early fall and early spring irrigation, we could store the water which we now apply on the ground in the wintertime.

Under our present system, the Fort Lyon Canal now diverts on the average, during the winter months, 35,000 acre-feet of water which, I believe, is at times 50 to 75 percent lost or wasted. If this water could all be stored and in turn used in the late fall and early spring, we could realize almost a 100-percent efficiency. The Fryingpan-Arkansas project would also make this saving possible.

There are vast areas of land that can be made no better by man's ability, but here is one that can by obtaining additional water by transmountain diversion. A better use can be made of the water available if controlled by a storage reservoir on the Arkansas River above Pueblo.

I would also like to present to you the following data I compiled from an operation on two of my own farms. Each of these farms consists of 240 acres of land. One farm has an irrigation pump on it. The other had just the irrigation water from the Arkansas River. The value of the crops from the farm which has the pump was $56,372.98 for the year 1954. The one with no pump was $11,581.56. There is a difference of $44,791.42. This land is under the Fort Lyon Canal and there are 416 more such units in this canal system. Using this difference of $44,791.42 on the two farms and multiplying it times the 416 units would give you $18,633,230.72.

The farm I pumped the water on had the following costs: $3,140 for electrical power, $1,067 for depreciation on the pump, and $640 interest on the investment making a total of $4,847. During the year I operated the pump 2,730 hours and pumped 1,500 gallons a minute. This represents approximately 750 acre-feet of water. The above cost of $4,847 divided by the acre-feet of water gives a cost of $6.46 per acre-foot, which is a little higher cost per acre-foot than the figure that is used in the Fryingpan project. It shows water is well worth the figure used in the project.

Seven hundred and fifty acre-feet of water pumped on the 240 acres gives 3.1 acre-feet of water per acre which is very close to 3 acre-feet of water per acre which the superintendent of our canal says would be almost an adequate water supply.

If the Fryingpan project comes to pass, it would almost give us an adequate water supply for irrigation. It is also true that 1 percent of the total area of the United States is irrigated, but this 1 percent feeds from 20 to 25 percent of the people. So increased production on irrigated land is very important if the population is going to increase as they say it is by 1975.

The Arkansas Valley is at a standstill—if not in reverse—due to the lack of water. All sources of additional water have been tapped. Transmountain water is our only chance.

Do you want us to be deprived of going forward by not allowing us to have additional water?

Mr. ASPINALL. Our next witness will be Mr. Ryan. We are glad to have you with us this morning. The experience I had with your father in the State legislature is a continuing personal pleasure.

STATEMENT OF TED R. RYAN, ROCKY FORD, COLO.

Mr. RYAN. I am Ted R. Ryan of Rocky Ford, Colo. I have lived in the Arkansas Valley in Colorado for 51 years and have been actively engaged in farming there for more than 30 years. I am here to present the situation of the farmers in the central part of the Arkansas Valley in Colorado regarding irrigation water supply.

I shall speak first of the general water shortages that prevail in my area, second, of the particular shortages under two representative irrigation ditches, and third, of the farming conditions and methods that result from these shortages, and finally of how these matters would be improved by the addition of water from the Fryingpan-Arkansas project.

The surveys conducted by the Water Development Association of Southeastern Colorado, assisted by the Pueblo office of the Reclamation Bureau, show the chronic shortage in irrigation water supply. These surveys also show the economic losses that result from this shortage. In these surveys more than 300 farmers prepared and presented detailed budgets of their present operations. They then prepared budgets to show the estimated production and expense with a complete supply of water. More than 150 ditch officials also assisted in this work. Not all irrigation ditches are affected alike, due to varying dates of their decrees. All ditches suffer from the shortage in the early spring before the mountain snows begin to melt, and again in late July and early August when all the mountain snow is gone. It is during both of these periods when the water is most urgently needed, because in the spring the water is needed to start the newly planted crops and because, in July and August, the water is needed to mature the crops.

The varying effects of this chronic water shortage were demonstrated by the number of farmer financial failures during the drought of the thirties. The greatest number of failures was among the farmers of those ditches with poorer water rights. The number of failures was in inverse proportion to the amount of water available on the farms. As the water shortage became more severe the number of failures increased. This was true because the cost of farming is almost as great with an insufficient water supply as with an adequate one. In addition, those farmers with an insufficient water supply were adversely affected at planting time, by either being restricted in the

kind of crops they could plant or by being forced to delay planting with a resulting loss in yields. To be a good farmer you must employ good timing. When inadequate water disturbs the timing of planting, cultivation and other farming procedures, poorer results must follow.

The farmers of our valley have in past years been quite diligent in attempting to correct these conditions. A number of small reservoirs have been built and small transmountain diversions have been constructed. Wells have been put down to supplement the water supply, but these wells have been limited in number and are of assistance only to single farms. The areas where underground water is available in sufficient quantity for irrigation are quite limited. In most cases the underground water is rapidly depleted by constant pumping, thus expensive and unreliable. While these attempts have been of value, they have not solved the problem. The shortages of water cannot be overcome without outside financial aid. With assistance, however, whereby the shortages can be eliminated and the income thereby increased, the farmers can easily repay the costs advanced by the outside assistance.

Figures show that the Fryingpan-Arkansas project would supply about 53 percent of these shortages in the average years, and would eliminate all the shortages in about half the years.

Turning to water shortages in particular instances, I want to refer to the Catlin Canal with whose problems I am familiar since it supplies my farm with irrigation water. The Catlin Canal diverts water from the main stem of the Arkansas River at its confluence with the Apishapa. It extends southeastward from there for 33 miles. There are 18,660 acres under its system, of which 15,797 are irrigated. There are about 250 farms. It has the following decrees: 22 second-feet, 1875; 226 second-feet, 1884; 97 second-feet, 1887.

The Catlin Canal has acquired in recent years supplemental water supply. It now owns seven-eighths interest in the Mount Piscah Reservoir and the Larkspur ditch in whole.

Mount Piscah Reservoir is located on Oil or Four Mile Creek in Teller County, Colo., near the city of Cripple Creek. It has a capacity of about 3,000 acre-feet.

Larkspur ditch is a small transbasin diversion on Marshall Pass. It produces 200 to 700 acre-feet annually, but due to difficulties of delivery has been of little use to the Catlin system. The Catlin Canal is a ditch with an above-average water right. Despite this fact, the Catlin Canal farmers experience water shortages in late March, April, and early May, and again in late July and early August.

A survey has been made by 23 representative farmers on the Catlin Canal to determine present financial losses due to water shortages and to determine how much of these losses could be eliminated by an adequate water supply. This survey shows that the financial losses that would be eliminated by securing additional water would amount to $29.98 gross or $9.78 net per acre. Two-thirds of this saving would go to labor and for services and supplies in the community, and one-third to the farmer. The multiplication of this saving per acre by 15,800 would give the total saving under the Catlin Canal if adequate water supplies were available; 15,800 is the total irrigated acreage under this canal system. This saving per acre multiplied by the total

acreage amounts to $473,684 gross annually or $154,524 net. This is how valuable additional irrigation water is to the farmers of the Catlin Canal.

The picture is somewhat different under another canal in my area. The Otero Canal has a less dependable water supply. As the Catlin Canal served as an example of a ditch with above-average supply of water, so will the Otero Canal serve as an example of one with a below average supply.

The farmer survey committee for the Otero Canal found that a benefit of $100.23 gross and $21.19 net per acre would result from an adequate water supply. For the whole canal system the benefits would total $533,700 gross or $112,840 net.

There are four other ditches in this area. The Rocky Ford Highline, the Oxford Farmers, the Rocky, and the Holbrook.

The Highland is about 80 miles long and serve 24,000 acres.

The Oxford is 13 miles long and it serves 4,500 acres.

The Rocky Ford is about 17 miles long and supplies about 5,000 acres. It is the oldest ditch in the area and has 111.7 second-feet decreed in 1874. There are only 430 second-feet decreed from the Arkansas prior to this date and therefore the Rocky Ford's supply is ample.

The Holbrook is about 43 miles long and supplies 12,201 acres.

While the shortages of irrigation water have varying effects upon the different canal systems, there is a similar general effect upon the farming conditions and methods. Because of these shortages, there is naturally, a reduced yield of the crops grown in the area. Because one of the periods of shortage comes in early spring, the result is a forced delayed planting in many seasons. Such crops as alfalfa and permanent pasture cannot be properly started. This delayed planting also adversely affects crop yields. It often happens, too, that due to prolonged spring water shortages, it becomes necessary for the farmer to completely change his planting plans. This change often forces the farmer to substitute a lower income crop for a better one.

As the season progresses and more water becomes available, due to the warmer weather melting the mountain snows, the farmer tends to overirrigate his crops. This overirrigation is encouraged by the thought in the farmer's mind that his water supply may diminish shortly. This malpractice of overirrigating results in leaching away the fertility and also causing water logging of the heavier soils. Also if unused, the water would benefit some junior appropriator, thereby helping to balance his supply.

While the Arkansas Valley farmers realize that these conditions and methods are undesirable and have attempted to correct them, the present water shortage prevents any satisfactory solution. However, with the additional water that can be supplied by the Fryingpan-Arkansas project and the better control of the time of delivery, most of these undesirable conditions and methods could be corrected.

Adequate water would permit a greater diversity of crops because irrigation water would be available at the proper time for the planting of any particular crop. Adequate water supplies would also mean greater yields to the farmers because water would be available during the two critical periods of early spring and midsummer.

Uniquely, too, adequate water supplies would conserve water in our area. When the farmer knows that he will have sufficient water, he

will apply it to his land only when and if needed. Under present conditions the water is applied excessively at certain times in anticipation of later shortages.

In summary, I have endeavored to show the conditions prevailing in the central part of the Arkansas Valley in Colorado. The farmers have there, in the past, suffered losses because of a chronic shortage of irrigation water. While they have attempted to correct this situation, they still experience shortages. The Fryingpan-Arkansas project would do much to relieve these shortages. The savings and benefits that would result from adequate irrigation water supplied by the Fryingpan-Arkansas project would be great enough enough for the farmers to well afford the costs. The farmers' willingness to assume this financial obligation was shown by the reports of more than 300 farmers who made reports in the surveys.

To further substantiate my position, I have with me the resolutions passed by three ditch boards which supply the water for the county in which I reside, stating that they feel that the price asked in this project per acre-foot of water is well within their means, and that they know they are able to make the repayments to the Federal Government. I would like to have them made a part of the record, Mr. Chairman.

Mr. ASPINALL. Without objection, the resolutions will be made a part of the record.

Hearing no objection, it is so ordered.

(The resolutions referred to follows:)

Resolved, That the board of directors of the Catlin Canal Co. do hereby authorize and direct Ted R. Ryan and Roy Cooper and any other persons representing the Water Development Association of Southeastern Colorado to represent the Catlin Canal Co. at any and all legislative hearings on the Fryingpan-Arkansas diversion project.

Resolved further, That we as the directors of the Catlin Canal Co., composed of over 500 individual users of irrigation water, strongly urge the passage of the bill and immediate completion of the project. This company stands ready, willing, and able to purchase water as needed at the proposed rates. We feel that this project will be of great value in stabilizing agriculture in this area, and thereby creating greater employment in the production of foods.

STATE OF COLORADO,
County of Otero:

I, Cover Mendenhall, secretary of the Catlin Canal Co., do hereby certify that the above is a true copy of a resolution duly adopted at a special meeting of the board of directors of the Catlin Canal Co. held Monday, March 7, 1955, at 10 a. m., at the offices of the company in Rocky Ford, Colo.

Witness my hand and the seal of said company this 8th day of March 1955.

[SEAL] COVER MENDENHALL, *Secretary.*

THE HIGH LINE CANAL CO.,
Rocky Ford, Colo., March 9, 1955.

COMMITTEE ON IRRIGATION,
United States Senate, Washington, D. C.

GENTLEMEN: In the opinion of the board of directors of the High Line Canal Co., expressed at the regular meeting of said board held on March 7, 1955, the stockholders of the High Line Canal Co. would be capable of paying an average of $5.40 per acre-foot for supplemental water for irrigation purposes.

Very truly yours,

HUGH E. PICKREL, *Secretary.*

Resolved, That the board of directors of the Holbrook Mutual Irrigating Co., at their regular meeting March 1, 1955, do hereby authorize and direct Ted Ryan and Roy Cooper and any other persons representing the Water Development

Association of Southeastern Colorado to represent the Holbrook Mutual Irrigating Co., at any and all legislative hearings on the Fryingpan-Arkansas diversion project.

Resolved further, That we as the directors of the Holbrook Mutual Irrigating Co., composed of over 250 individual users of irrigation water, strongly urge the passage of the bill and immediate completion of the project. This company stands ready, willing, and able to purchase water as needed at the proposed rates. We feel that this project will be of great value in stabilizing agriculture in this area, and thereby creating greater employment in the production of foods.

SIMON SCHULTZ, *President.*

Mr. ASPINALL. Does that complete your statement, Mr. Ryan?

Mr. RYAN. May I further comment that these ditches are operated by mutual irrigation companies for and by the farmers mainly for their own benefit.

Mr. ASPINALL. The Chair has one question before going around the committee.

Each one of you gentlemen is familiar with what has been referred to as the operating agreement between the different authorities of Colorado as far as the operation and maintenance of the Fryingpan-Arkansas is concerned with relation to taking the water from western Colorado to eastern Colorado; is that correct?

Mr. EVERETT. Yes.

Mr. MARSHALL. Yes.

Mr. RYAN. Yes.

Mr. COOPER. Yes.

Mr. ASPINALL. Each one of you, as representatives of the farmers of the Arkansas Valley who are to benefit from this project, will do your best to see that the operating agreement is enforced as written and understood?

Mr. EVERETT. Yes, sir.

Mr. MARSHALL. That is correct.

Mr. RYAN. Yes.

Mr. COOPER. Yes.

Mr. ASPINALL. As agreed upon by the representatives of the State?

Mr. EVERETT. That is right.

Mr. MARSHALL. Yes.

Mr. RYAN. Yes.

Mr. COOPER. Yes.

Mr. ASPINALL. The Chair recognizes the gentlewoman from Idaho, Mrs. Pfost.

Mrs. PFOST. Mr. Everett, do you live on the west slope?

Mr. EVERETT. No, ma'am, at the foot of the eastern slope.

Mrs. PFOST. In other words, then, you would be benefited by bringing the water from the west slope onto the east slope by the storage of water and the releasing from these dams on the western slope?

Mr. EVERETT. That is correct.

Mrs. PFOST. I notice on page 2 of your statement you mentioned 127,000 acre-feet of water as being lost so far as crop production is concerned. Is that because the canals need to be concreted, or are they old and washed out, or what is the situation?

Mr. EVERETT. The situation is that we have innumerable small ditches that carry as little as 2 or 3 second-feet. They are all small, and our largest ones carry no more than 50 second-feet of water. By a consolidation of those ditches we would eliminate the loss through

ground seepage and evaporation. That is where our major loss is on that portion of the ground.

Mrs. PFOST. Under this project you would have one large canal, I presume, then, with larger feeder canals that would supply the water?

Mr. EVERETT. If we were able to have water delivered, the irrigators among themselves would consolidate their own ditches, and then we could put supplemental water in those ditches and thereby would eliminate much of our ground seepage and evaporation.

Mrs. PFOST. Are the canals leading off from the main canal a part of the cost of this project?

Mr. EVERETT. No, ma'am. Our ditches would have to be consolidated by mutual agreement among the farmers themselves.

Mrs. PFOST. But you are willing to assume that additional expense in view of the fact you would have additional supplemental water?

Mr. EVERETT. That is right.

Mrs. PFOST. I think that is all.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. I would like to ask first, Mr. Ryan, how large is the area which you have under production?

Mr. RYAN. Personally?

Mr. SAYLOR. Yes.

Mr. RYAN. I farm 60 acres.

Mr. SAYLOR. Mr. Marshall?

Mr. MARSHALL. Could I carry on with that statement a little further? A little over 2,000. My father on the home place has farmed a little over 400 for 54 years.

What has happened, upstream the domestic use of the water comes first, and you have got to deliver that to them. The old ditches, some of them date back as far as 1861.

I was just talking on the production of hay. I have had tests of 900-¼ tons of hay on fourth cuttings, and you cannot get that any place in the United States. That is because of the hot season. We have a long growing season there in the valley. I am not trying to give you a sales talk.

I am talking of my own dealing. I have a business inside of a business, and it costs me a little over $100,000 on my own deal, and I figure it cost my neighbors $1,800,000 for the feed which I could not buy from them, and I had to spend possibly $150,000 carrying that in by truck, taking care of a mutual friend of ours, the American Storage Co. in Philadelphia.

Mr. SAYLOR. I have been told all about you, and I know more about you than you know about me.

Mr. MARSHALL. I had lunch with a very good mutual friend of ours, Al Faulhaber yesterday. Thank you.

Mr. SAYLOR. Mr. Everett, how many acres do you have under cultivation?

Mr. EVERETT. I have 320 under cultivation.

Mr. SAYLOR. Mr. Cooper?

Mr. COOPER. Nine hundred and twenty.

Mr. PILLION. Under cultivation?

Mr. COOPER. Yes.

Mr. SAYLOR. Now one of the provisions of this bill and reclamation law is that the 160-acre law will be applied even though this is only

supplemental water. Now how is that going to affect the farmers in that area?

Mr. MARSHALL. It would be 320 for man and wife?

Mr. SAYLOR. Three hundred and twenty for man and wife.

Mr. MARSHALL. I am willing, if we get this water, to sell down to that, if I have to. I could make more on 320 if I knew I was getting the water than on the 2,000, because I spend at least 50 to 75 an acre for fertilizer alone, and over half of it last year was not irrigated. That 100,000 I lost last year, I would be glad to cut some of that clear out.

Mr. SAYLOR. How many farms are there in the Arkansas Valley which would be benefited by this water which would be in excess of the 160-acre limitation?

Mr. MARSHALL. Very few. Not where the man and wife would have 320. Very few. Is that not right?

Mr. COOPER. Right.

Mr. MARSHALL. Everybody would be more than glad to cooperate I can answer. I know, I have talked to several hundred of them.

Mr. SAYLOR. Now a large part of the cost of this project, a substantial portion of the cost of this project, is the dam which is to be built on the western slope, the canals that are to be built on the western slope, and the tunnels that are to be drilled through the mountain. Would the farmers out there be in a better position if they were able to put to beneficial use by increasing the storage of the headwaters of the Arkansas River and relining the canals so that this 50 percent referred to by Mr. Everett in losses would not occur?

Mr. MARSHALL. May I answer that and then I will quit talking?

Mr. SAYLOR. Yes.

Mr. MARSHALL. I would say nine-tenths of the ground is heavy adobe, clay, which just does not seep the water, as sandy or gravelly ground where you run ditches through gives a certain amount of seepage. But I know in our vicinity up and down the valley nine-tenths of that ground is heavy clay or adobe, and that ground does not seep. In fact, it is hard, if you have really muddy waters, it just takes so long even to soak out the pasture lands. I mean canals would be an unnecessary expense, I would say, for more than nine-tenths.

Mr. RYAN. May I point out, Mr. Saylor, that the irrigated portion of our valley is almost 300 miles long, and there is all sorts of conditions, all sorts of soil types.

In Mr. Everett's portion of the valley it is glacial deposits, it is quite rocky and sandy and quite permeable soil. Down where we are there is much more impervious soil, and we do not have the seepage problems, the ditch losses, in the same proportions that Mr. Everett has. I am just pointing out there are many conditions.

In answer to your original question, may I suggest this answer—that we are informed by the engineers who have studied this, both for the Reclamation Bureau and the State engineers and the private engineers, that it takes this importation of this 69,000 acre-feet of water to balance this thing and make it work. These storages have been contemplated, but they do not figure out.

Mr. SAYLOR. They do not what?

Mr. RYAN. They do not figure out. They will not pay for themselves. It is the balancing factor.

My power of telling you that is not too good, but it is the amount of water that it takes to make the thing a profitable relationship to the hydroelectric end of it, to the municipal end of it, and to the irrigation end of it.

Mr. SAYLOR. The reason I ask these questions—you men are farmers in the area and producers, and when you say, as Mr. Everett did, that in his area 50 percent of the water is lost, it seems to me that it might be true—Mr. Marshall points out he does not have the same condition in his immediate area, and you point out that there are 300 miles of ditches and there are varying conditions, but certainly if there is 50 percent loss in any sizeable portion of that, as Mr. Everett has pointed out, the recovery of that alone would justify the lining of the canals. Maybe not throughout, but at least in that section.

Mr. RYAN. Mr. Saylor, may I point out that loss is to his immediate area only, because it returns to the river, the river being the low point of the valley and the water being diverted out on these upper lands. Then that seepage loss returns to the river.

Mr. SAYLOR. Some of it never gets back, though.

Mr. RYAN. Possibly. But you know, if you take—I am not in a position to supply you this morning with those figures—but you see, through use and reuse, and then reuse again, we use, divert from the river more water than originates to the river through that reusage, and part of that reusage is this seepage flow from Mr. Everett's area.

Mr. SAYLOR. Of course, some of it comes from the underground flows which are used by the pumps in the area, too.

Mr. RYAN. Sure.

Mr. SAYLOR. That is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from North Carolina, Mr. Shuford.

Mr. SHUFORD. Off the record.

(Discussion off the record.)

Mr. SHUFORD. There is one question I want to ask. What crops are raised in this irrigated area?

Mr. RYAN. As I indicated, our valley from Leadville to the State line is a little over 300 miles long. In the upper reaches of the valley, as Mr. Everett indicated, there is hay, irrigated meadows, some vegetables, and as you come down the valley, in our part of the valley, hay, corn, cereals, and sugar beets, melons. You might say general farming.

Mr. SHUFORD. But you do produce hay and corn. Is that your main crop?

Mr. RYAN. In my immediate area the main crops are sugar beets, alfalfa, hay, and cereals.

Mr. SHUFORD. And you raise some melons?

Mr. RYAN. We grow melons, quite a few vegetables, potatoes, onions, some head lettuce.

Mr. SHUFORD. Mr. Marshall, what are the chief crops in your area?

Mr. MARSHALL. Practically the same. We are neighbors about 4 miles apart. But something happened in the last 2 weeks there. Hay ran along all winter at $30 a ton and then jumped to $40 and $50 right now, and it is not obtainable. Take the drought areas and also the drought cattle areas, where those stockmen have got to come in and buy hay in our valley, and they are just wiped out. They are

going to have to ship hay in from some place even in the next few years.

Mr. SHUFORD. Mr. Cooper, what are the principal crops in your area?

Mr. COOPER. About the same. I mentioned alfalfa, corn, onions. potatoes, sugar beets.

Mr. SHUFORD. It applies to the whole valley?

Mr. COOPER. About the same; yes, sir. There are a little more diversified crops in different sections than there are in the other, but there is some of each grown in about every section.

Mr. SHUFORD. What is the value per acre of your lands within the area now irrigated under the present system?

Mr. MARSHALL. I have been offered $500 for some of my best land, and I would not take it because I have produced as much as $2,000 on onions 1 year, and with drought conditions I have lost money the next. Then you have a crop that will produce over $2,300 in a terribly good year.

Mr. SHUFORD. Would you say $500 would be an average?

Mr. MARSHALL. No.

Mr. COOPER. Two and one-half.

Mr. MARSHALL. I would say from $400 to $800.

Mr. SHUFORD. I mean the average. I do not mean the best or the poorest.

Mr. MARSHALL. I would start down at $250 then. Say from $250 to $800. Some up there have gone for around $1,000 in some of the older ditches.

Mr. SHUFORD. Thank you very much.

Mr. ASPINALL. The Chair recognizes the gentleman from Utah, Mr. Dawson.

Mr. DAWSON. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from New York, Mr. Pillion.

Mr. PILLION. Just a question or two. I think the gentlemen have made out a very good case for their area, but I am just wondering about the national situation with regard to agriculture.

As you know, we are having a difficult time with our surpluses here and wondering what to do with them. And yet the main argument here seems to be that with irrigation this area would be able to raise and produce more crops, which, of course, is contrary to what our national interests might be at the present time.

Mr. Cooper's statement, on page 7, states that the irrigation project here would increase the crops so far as onions, sugar beets, potatoes, tomatoes, and that sort of thing is concerned, and I would just like to ask this question: Is there any present or prospective shortage in these farm products nationally that could not be supplied by crops grown upon lands that require no investment by the United States Government?

Mr. MARSHALL. Could I answer that?

Mr. PILLION. Surely.

Mr. MARSHALL. Right now the packinghouse at Pueblo, the American Storage Co. and others, feed at least 100,000-odd cattle all the time between Pueblo and the State line. Right now they are out of hay, and have to do like I did this year. I expect I paid $150,000

trucking bill to get the extra grain in there, and here we sit right in the corner of about 4 or 5 of the best cattle-producing areas there are. And they are raised on grass up to 600 or 800 pounds, and we finish them in there.

If I might answer what would be your question, we have got it under production. I wish we had another 100,000 acres in feed crops alone, in grain there in our valley. It would save me around $150,000 a year trucking bill.

Mr. PILLION. I quite understand the answer, in that you have a local shortage, but I am talking about a national shortage for the Nation as a whole, because, you see, for instance, in sugar beets, there is a subsidy now paid by the consumer upon sugar, and if you increase your sugar production in Colorado, it will be in competition with the production of other States. It will just mean an increased subsidy in order to take care of the surplus. We have clamor for the increased imports of sugar, say, from Cuba where they produce it at about 4 cents, while we are paying somewhere around 6 or 7 or 8 cents for domestic sugar. And we have all these other problems to deal with. You have to take this particular sectional interest and balance it against the national costs and national interests, and even international interests, and it makes quite a problem.

Mr. DAWSON. Will the gentleman yield?

Mr. PILLION. Yes.

Mr. DAWSON. Where is the subsidy on beet sugar?

Mr. PILLION. Is there not a tax upon the refiners paid for by the consumers at large which increases the price of sugar?

Mr. DAWSON. Yes, that is true, but that is no subsidy.

Mr. PILLION. Oh, yes; there is.

Mr. ASPINALL. The Chair would suggest that we take care of that at another time.

Mr. PILLION. It is very pertinent, Mr. Chairman. We may defer it to some other time, but I just raise that to show there are problems other than the sectional problems involved. And I appreciate the sectional problems. I know they are pressing.

Mr. ASPINALL. The Chair does not object to your questioning these gentlemen on the subsidies.

Mr. PILLION. I have no more questions.

Mr. ASPINALL. The Chair recognizes the gentleman from Idaho, Mr. Budge.

Mr. BUDGE. Mr. Chairman, I have only this comment to make in response to the comment of the gentleman from New York. I think that the gentleman from New York will find, if he takes a list of the products which are grown on the irrigated acreages, they contribute very little to the Federal Government's expenditures in surplus agricultural commodities. As a general statement, the irrigated acreages contribute only a very small portion of the Government's bill for the present storage of supplies held by the Commodity Credit Corporation.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

Mr. CHENOWETH. I want to commend all four of these witnesses for their very fine statements. I am sure they have been able to impress upon the committee the necessity for additional water in this highly productive agricultural area.

I would just like to bring out 1 or 2 points while they are on the stand.

The first is that this productive Arkansas Valley has been developed entirely by private enterprise and private money. Is that right, Mr. Ryan?

Mr. RYAN. Correct.

Mr. CHENOWETH. How many ditch companies would you say there are in the Arkansas Valley from Pueblo to the State line?

Mr. RYAN. There are about 22.

Mr. CHENOWETH. And some of these are rather large ditch companies?

Mr. RYAN. Some are.

Mr. CHENOWETH. And you have what is called the Arkansas Valley Ditch Association, which comprises all of these ditch companies; is that right?

Mr. RYAN. Yes.

Mr. CHENOWETH. And these ditch companies are constantly at work, so far as they are able and with their own money and own engineers, to develop and improve their actual physical properties and make full use of every drop of water available.

Mr. RYAN. Yes.

Mr. CHENOWETH. Is it not true, also, so far as the acreage limitation is concerned, that approximately 90 percent of the farms on the Arkansas Valley are comprised of less than 100 acres? What would you say would be the average acres?

Mr. RYAN. I would not care to venture a figure.

Mr. CHENOWETH. How many acres did you say you farm?

Mr. RYAN. I farm 60.

Mr. CHENOWETH. Would you say that would be about the average?

Mr. COOPER. Fort Lyon has 100,000 acres of irrigated lands, and they figure there are 419 farm units. So what is that? That is about 250 acres per unit.

Mr. CHENOWETH. And Fort Lyon is one of the large companies?

Mr. COOPER. Yes, and that is the average of man and wife, who are entitled to 320. So on the average they would come under the limitation.

Mr. CHENOWETH. The reason that the 160-acre limitation is waived in this bill is on account of the fact that some of this acreage is farmed by sugar companies. There are three sugar factories in this area, and they must produce a certain amount of sugar beets in order to have the beets available for operation of those factories. Is it not going to be rather difficult to enforce the 160-acre limitation in that area on that account?

Mr. COOPER. Yes, sir.

Mr. CHENOWETH. Do any of you think of anything else you would like to tell the committee?

I think you have made very splendid statements.

Mr. MARSHALL. On the question of overproduction, I think with the increase in population, even though they found out they got a little too much canned hamburger, and a few things—in the newspaper this morning; I think we are way behind the increase in population. I think what we can contribute in meat, which will be shipped back there dressed—I do not think we are going to be able to keep up with your needs.

Mr. CHENOWETH. One last statement, Mr. Chairman.

I think these four witnesses have demonstrated beyond any possibility of a doubt that the farmers in this area are able and willing and anxious to pay the amount that will be charged for the water that will be diverted and made available under this project. Is that correct?

Mr. EVERETT. Yes.

Mr. MARSHALL. Yes.

Mr. RYAN. Yes.

Mr. COOPER. Yes.

Mr. ASPINALL. If the gentleman will yield?

Mr. CHENOWETH. Yes.

Mr. ASPINALL. As I understand, when you answered Mr. Saylor's question about being willing to come under the provisions of the 160-acre limitation, all of you suggested you would be willing to come under that limitation if you could get the benefits of this act. Is that correct?

Mr. MARSHALL. If we had to; yes. I think everybody would feel the same: 320 for some would be kind of a hard breakdown, but I can take 320 and do more than on the 2,000 without water.

Mr. ASPINALL. This committee has had before it already this session the proposition that, if there were any areas within an area to be served by a project where they did not come within the 160-acre limitation, specific units did not come within that, then those units should be charged interest on the money furnished to them for the construction of facilities which would enable them to irrigate lands in excess of 160 acres. Do you think the people of the Arkansas Valley would be favorable to that proposition?

Mr. RYAN. I would not want to attempt to answer on that, Mr. Aspinall. I am just cautious.

Mr. ASPINALL. Do you see any difference in the philosophy back of the proposition of furnishing water for 160 acres of land when the water is primary water as compared to supplemental water?

Mr. RYAN. I do, for several reasons, sir. In the first place, it is my understanding the original reclamation law, which designated 160 acres, was contemplating what they thought of as family-sized farms. We all know that is variable under various conditions. There are some places where 20 acres is a family-sized farm and furnishes plenty of work. There are other types of farming, like in Mr. Everett's area, where it is grass and cattle or sheep, and 160 is not.

Mr. ASPINALL. The comparison is not between you and Mr. Everett but between you and Mr. Marshall.

Mr. RYAN. I come within it. That is the reason I said I did not wish to speak. I just wanted to point out that there are various things. There are not so many large units in my immediate vicinity.

Mr. ASPINALL. Do you still adhere to the philosophy that Government help should be given only to farming unit types of operation as far as reclamation aid is concerned?

Mr. RYAN. Yes; if they would not specify any given number of acres, because I think conditions and areas make that variable. We know that, Mr. Aspinall.

Mr. DAWSON. Will the gentleman yield to me?

Mr. CHENOWETH. Yes.

Mr. DAWSON. It is my understanding that you are creating a conservancy district in this area to help repay for this project.

Mr. RYAN. Yes.

Mr. DAWSON. And under that arrangement the landowners are going to be assessed, have a regular tax assessment, on their lands to back up the repayment of this money to the Government. You are all willing to do that?

Mr. EVERETT. Yes.

Mr. MARSHALL. Yes.

Mr. RYAN. Yes.

Mr. COOPER. Yes.

Mr. ASPINALL. Thank you very much, gentlemen.

The chair recognizes the gentleman from Colorado to call the next witnesses.

Mr. CHENOWETH. Mr. Chairman, I would like next to call the group that represents labor.

Mr. Fay Frazier, Pueblo, Colo., Colorado Fuel & Iron Corp., member of the United Steel Workers of America Union; Mr. George White, also of Pueblo, and also of the United Steel Workers of America Union, CIO, and also Mr. Jack Morrison, representing the International Brotherhood of Electrical Workers, Pueblo, Colo., A. F. of L.; and Mr. Leo Goodman, of the CIO.

Mr. ASPINALL. You may proceed.

STATEMENT OF FAY D. FRAZIER, PUEBLO, COLO., UNITED STEEL WORKERS, CIO

Mr. FRAZIER. My name is Fay D. Frazier of Pueblo, Colo. I hold the office of main grievance committeeman of local 2102, United Steel Workers, CIO. I am employed by the Colorado Fuel & Iron Corp., of Pueblo, Colo., in which city or the vicinity thereof I have resided since 1933. I have been requested and instructed by the above organization to represent the CIO in support of all phases of the Fryingpan-Arkansas project.

Organized labor is interested in job security, continued prosperity, and the maintenance and improvement of the existing economy, not only of the Nation and Colorado, but particularly of the Arkansas Valley. In this respect the interests of the Arkansas Valley, the State, and the Nation, and organized labor are identical—all depend upon the existence and availability of an adequate water supply. This accounts for the interest of organized labor. Present water supplies are inadequate for the existing requirements of industry and agriculture, cities and farmers. The cost of procuring additional supplies of water for the needs of the area exceeds the ability of the users to finance the project without Federal assistance. The Fryingpan-Arkansas project bespeaks a genuine need for water, and from all information that we can obtain it presents ample justification for the authorization of a Federal reclamation project. Additional waters made available by the project would make possible more job opportunities, increasing the self-sufficiency and productivity of the Arkansas Valley and the State of Colorado.

In addition, it will make possible substantially increased industry in the area, which increase will afford opportunities to widely diversi-

fied industries. Diversification and the distribution of industry will fit in with the defense requirements of our Nation.

In 1952 I purchased a fruit farm adjacent to Pueblo with the view of quitting the C. F. & I. and becoming self-employed. In 2 years, due to an inadequate water supply, 50 percent of the 1,500 trees were dead. It is a heartbreaking future the people in agriculture, industry, and the community face with an inadequate water supply.

The CIO as an organization is confident that the authorization and construction of the Fryingpan-Arkansas project will greatly increase both the population of the area and its industrial opportunities. It is with an honest and sincere belief that we say the Fryingpan-Arkansas project should be authorized.

Mr. ASPINALL. Thank you, Mr. Frazier.

Who is next?

STATEMENT OF GEORGE J. WHITE, PUEBLO, COLO., REPRESENTING UNITED STEEL WORKERS OF AMERICA, FRANKLIN D. ROOSEVELT LOCAL 2102, CIO

Mr. WHITE. I am George J. White, age 34, of Pueblo, Colo., representing the United Steel Workers of America, Franklin D. Roosevelt Local 2102, affiliated with the Congress of Industrial Organizations, and presently serve in the capacity of secretary of the grievance committee. Local union 2102 represents the production and maintenance workers of the Colorado Fuel & Iron Corp. and has a membership of 6,020. I am a lifetime resident of Pueblo and have worked for the C. F. & I. Corp. for 14 years; of those 14 years, I have been a union member 13 years and an officer or committeeman for 8 years.

Our union is in favor of the Fryingpan-Arkansas project and I will herein attempt to give our views on the immediate and future benefits we as citizens will enjoy through an expanded and prosperous community which would be made possible by the project.

The majority of union members are family men and homeowners and as such are civic minded and interested in the growth and development of Pueblo, and of Colorado as a whole. Water has become more of a problem with the growth of the Pueblo area during and after the war and will continue with the expansion of the Pueblo Ordnance Depot and the C. F. & I. This year it was necessary, as early as March, to restrict irrigation in Pueblo, and from the present outlook, more severe restrictions will be imposed by early summer.

If we are successful in securing this project, it will mean an almost immediate expansion of Pueblo as is evident by the number of prospective small industries that have indicated their desire to locate in this area if water were available.

If either the two major sources of employment in this area found it necessary to release some of its workers or execute a complete stoppage, the immediate result would be a recession of all businesses: the continuance of such a condition inevitably resulting in further unemployment and a ruination of our economy. However, if more people were employed in divers industries, the chances of such a demoralizing condition would be minimized. The expansion of small business, however, would create a greater labor market and would balance the two major employers, the C. F. & I. and the Pueblo Ordnance Depot, by

having the capacity to absorb workers who are laid off, and thus prevent most of the unemployment problems and stabilize the local economy.

It is certainly not good for an area as large as is involved here to be so dependent on two employers and an increase of water and power would undoubtedly be influential in bringing other industries to the area, resulting in the placement of more laborers.

With the expected expansion of the area, it would offer unlimited opportunities for both business and professional careers. In our opinion, this is a major factor: The average millworker has 3 or 4 children and they will all be seeking employment someday but with employment limited as it is, the unfortunate result is that these future workers will be forced to leave home to seek positions elsewhere, causing unhappiness for both the parents and the children and possibly an instability that could very easily lead them down the wrong path of life. Furthermore, it isn't advantageous or complimentary to a community if the "workers of tomorrow" are forced to leave their hometown because it could not fit them in and then not be available when the need for them arose.

The project would have a twofold effect on C. F. & I. employees. With farming and allied industries expanding, products manufactured at the C. F. & I. Pueblo plant would find a ready and close market, i. e., the C. F. & I. makes all forms of wire fencing, baling wire, barb wire, et cetera.

Assuming the C. F. & I. were to get the contracts for supplying steel products for the project, all of it could be produced locally in Pueblo except for some sizes of required pipe. Besides the monetary savings to the project, it would mean they would have enough contracted work to employ all its employees 1 month; this includes the time spent in iron ore and coal mining, the railroad shipping thereof, and so forth. Listed below are verified figures supplied me by the C. F. & I. on man-hours required to produce the estimated steel products required in the construction of the project.

Product	Amount required	Man-hours required
Reinforcing steel	175,129,000 pounds	1,397,362
Structural steel	12,642,700 pounds	82,008
Miscellaneous steel bars and shapes	325,900 pounds	2,757
130-pound rails	7,000 gross tons	84,155
Pipe, 22-inch and 26-inch	70.6 miles	149,600
Total		1,715,882

We want it understood that our point of view is not based on a selfish desire to keep only Pueblo and vicinity employed as the above points out that some sizes of the required pipe cannot be produced locally and would be obtained from Claymont, Mass. Also, not all the ore and coal is mined in Colorado but in the adjoining State of Wyoming.

In endorsing the project, we can see a better and larger community—one in which our children can grow up healthy and happy and can look forward to a secure future—a future in which a balanced economy will offer full employment.

In summarizing, we feel that what is good for labor is good for the community, State, and country, and the Fryingpan-Arkansas project will offer benefits to labor, thus being beneficial to all.

We would appreciate your giving it serious consideration. Thank you.

Mr. ASPINALL. The next witness will proceed.

STATEMENT OF JACK P. MORRISON, PUEBLO, COLO., REPRESENTING THE AMERICAN FEDERATION OF LABOR FOR THE STATE OF COLORADO

Mr. MORRISON. My name is Jack P. Morrison and I represent the American Federation of Labor for the State of Colorado.

Approximately 47 years of my life have been spent in the immediate vicinity of Pueblo and the Arkansas Valley. During this entire period I have been closely associated with organized labor, first in the role of an interested onlooker and later, and at the present time, as an active member.

I can personally vouch for the 100 percent support by organized labor of this great project, and while my entire group recognizes and appreciates the values and benefits to be derived from its completion, other than those pertaining to payrolls, employment, et cetera, I wish to discuss these phases of the project only, and have no apologies to make for what might on the surface appear to be a selfish or mercenary attitude.

On all estimates of the cost of the Fryingpan-Arkansas project, the item "Payroll" has been listed as the largest one item to be considered, and if, for instance, the estimated cost of $156 million is used, it is conservatively estimated that the payroll alone will amount to $52 million or 33 percent of the entire cost. Sixty-six percent of the workers involved will be skilled, 22 percent semiskilled, and 12 percent common labor. A breakdown of the different crafts, or classification, of such workmen in relation to their importance on the construction, shows the approximate man-hours for each craft as follows: Heavy equipment operators, 7,650,000; carpenters, 4,420,000; pipefitters and welders, 1,940,000; structural steel workers, 1,940,000; electricians, 1,450,000. Above classifications all come under the heading of skilled workers and in addition to the man-hours listed, the helpers, or semiskilled workers are expected to raise the total figure by 9,400,000 man-hours and the common labor group by 5,400,000 man-hours.

A quick rundown of how the workers will spend the approximate $52 million they will earn is as follows: Food, $13,399,577; housing, utilities, et cetera, $7,466,992; household operation, $2,028,520; furnishings and equipment, $2,242,063; clothing, $5,978,797; transportation, auto, et cetera, $5,925,708; personal care, $1,121,086; medical, $2,135,386; recreation, $1,975,232; education (formal), $213,542; gifts, contributions, et cetera, $1,121,076; insurance, $1,601,548; personal tax (State and Federal), $8,273,637.

The above figures represent of course the period of actual construction. However, organized labor is looking beyond this period and visualizing the vast amount of maintenance on the completed project. This vision holds a promise of job opportunities in new industries, minimum unemployment, steady incomes, elimination of

manpower migration, and a rise in living standards for workers with increased opportunities for them and their families. All of this will go far toward inspiring the construction worker with a feeling of dignity comparable to that of his white collar or professional neighbor.

Mr. ASPINALL. The Chair understands that you and your organization support without qualification the legislation now before this committee. Is that correct?

Mr. MORRISON. We do wholeheartedly.

Mr. ASPINALL. Mr. Goodman.

STATEMENT OF LEO GOODMAN, SECRETARY, CIO NATIONAL COMMITTEE ON ATOMIC ENERGY, POWER, AND RESOURCES DEVELOPMENT

Mr. GOODMAN. Mr. Chairman, I am Leo Goodman, secretary of the CIO national committee on atomic energy, power and resources development.

I would like to take a few brief moments to testify orally in behalf of the national CIO.

I would also like to submit for the record a prepared statement in behalf of Mr. Frank Hoffman, legislative representative of the United Steel Workers.

I would also like to submit for the record a resolution adopted by the Pennsylvania CIO council at their recent 18th annual convention held in Philadelphia, Pa.

Mr. ASPINALL. Do you have a written statement of your own, Mr. Goodman?

Mr. GOODMAN. No, I do not.

Mr. ASPINALL. Unless there is objection, the statement of Mr. Hoffman and the resolution referred to by Mr. Goodman will be made a part of the record immediately following the presentation by Mr. Goodman himself.

Hearing no objection, it is so ordered.

Mr. GOODMAN. I appreciate the opportunity to appear here in behalf of the national CIO in behalf of the reclamation legislation which is pending here before you.

For many years the CIO has supported the reclamation projects in the West. For many years there has been inadequate understanding as to the reasons why the CIO, an organization of industrial workers located primarily in industrial centers, have supported programs which serve fundamentally to benefit agricultural development of the 17 arid States. The CIO supports reclamation because we believe in the healthy expansion of the economy of the United States. We believe that there are certain basic principles guiding the Nation's resource development, and whenever the Congress considers reclamation proposals which include these principles, the strength of organized labor represented in the CIO has been found behind these programs.

We have proposed comprehensive river development for many years. We have felt that this proposal is bipartisan and should be considered in the light of the future needs rather than of present-day politics.

It is clear that the history of the development of the West for the past 50 years has depended upon reclamation policy.

At a recent meeting of the CIO national committee on power, atomic energy, and resources development, held in Denver, Colo., which includes O. A. Knight, president of the Oil, Chemical & Atomic Workers, as national chairman; James B. Carey, president of the International Union of Electrical Workers; Emil Mazey, treasurer of the United Automobile Workers; A. T. Jones, vice president of the Communication Workers of America; Elwood Swisher, vice president of the Oil, Chemical & Atomic Workers; Joseph Childs, vice president of the United Rubber Workers; I. W. Abel, treasurer of the United Steel Workers; John Chupka of the Textile Workers Union of America; Joseph Fisher, president of the Utility Workers of America; A. F. Hartung, president of the International Union of Woodworkers; and myself as secretary, and representatives of our various State affiliated bodies in California, Colorado, Massachusetts, Minnesota, Missouri, New York, Tennessee, Texas, and Utah.

Expert witnesses appeared before this committee and presented thanks regarding this proposed project, and the economic, political, and legislative aspects were considered. At a subsequent policy-making session, this committee voted active CIO support of the Fryingpan-Arkansas project as a necessary part of the overall development program for full utilization of the waterpower in the interests of the people.

The CIO is interested in and supports the Fryingpan-Arkansas project because it is essential to the continued prosperity, growth, and development of an important industrial and agricultural area within the State of Colorado.

The benefits of this project to agriculture have been outlined by other witnesses and I will not duplicate their testimony here other than to add that our organization heartily endorses reclamation work which will stabilize and strengthen our agricultural economy.

In addition to irrigation water, the Fryingpan-Arkansas project will supply municipal water to Pueblo, which is a major industrial center of the Western United States, to Colorado Springs, which is now the headquarters of the new United States Air Academy, and to several smaller communities in this watershed area.

In these recent decades of industrial and municipal growth, an assured water supply is becoming of increasing importance. The availability of water is now one of the principal determining factors in the location of new industrial plants. Even here in the humid East where, for generations, the problem has not been to obtain a water supply but to get rid of surplus rainfall, the situation is changing as pumps suck our underground reservoirs dry.

In the Western States, this situation has existed for many years because the rainfall there is only half or a third or less of that which the remainder of the country enjoys. However, the West is a treasure-house of natural resources in minerals, oil, forests, and grazing lands with untold opportunities for industrial expansion.

To develop these resources it has first been necessary to develop a water supply which is largely contained in the snow banks of the high Rocky Mountains. This development has proceeded in a typical pattern. The relatively small and inexpensive projects for the diversion and use of rivers were first built by individuals and small, privately organized groups.

Then as the pressure of population and economic demands grew larger and more difficult and expensive projects were undertaken, many of them by private financing but many others by the Federal Government. These latter projects were all undertaken on a reimbursable basis, and we think are one of the best investments our Government can make.

They not only return the funds loaned by the Government but open up new agricultural and industrial opportunities which bring in more returns by a vastly widened tax base. More important than either of these, of course, are the opportunities for employment of an expanding labor force. These we must have if our Nation is to continue to prosper. We cannot remain static.

Mr. Chairman, at this time I would like to make reference to the resolution adopted by the Pennsylvania State Industrial Council.

Mr. ASPINALL. How long will it take?

Mr. GOODMAN. Just one moment.

I bring this resolution to your special attention because I think it shows that the industrial workers in the East have learned that the West needs reclamation projects. In the past when this kind of program has been before your committee and before the House, it has been possible for those forces who are against this kind of program to rally support from the industrial East, but this resolution, in my opinion, shows a growing awakening of the industrial workers in the East that the future of the country requires support for reclamation programs in the West. And though Pennsylvania, when the bill was before the House the last time, voted almost solidly against the rule, I think you will find that this kind of an awakening represented by this resolution will result in increasing support for this project and other reclamation projects which you have before you and which, if they move together, can bring a success in the House and in the Congress as a whole.

So, in behalf of the CIO, I urge that you report this bill favorably as soon as possible.

Mr. ASPINALL. Thank you very much.

(The statement and resolution submitted by Mr. Goodman follow:)

STATEMENT OF FRANK HOFFMAN, LEGISLATIVE DIRECTOR, UNITED STEELWORKERS OF AMERICA, CIO

My name is Frank M. Hoffman. I am the legislative representative of the United Steelworkers of America, with offices at 1001 Connecticut Avenue NW., in the city of Washington, D. C. I appear in behalf of the steelworkers in Colorado and Utah.

Pueblo has a major steel industry which is growing as the West grows. It and the associated industries which it attracts must have a guaranteed water supply if we expect private capital to continue to invest there. This can be accomplished by the Fryingpan-Arkansas project. It will guarantee progress and expansion, which will guarantee labor a market for many years to come.

In speaking of the value of reclamation to the industrial economy, I am reminded of another experience in the steel industry during the war. Across the Rocky Mountains from Colorado, in Utah, the Bureau of Reclamation had the Provo River project under construction when the Second World War broke. This project was designed to serve a rich agricultural area in the Salt Lake and Utah Valleys, as well as to provide some municipal water to Salt Lake City.

There was a small steel plant in operation at Provo, and when the need arose for a quick expansion of the steel industry the Utah Valley was selected for a plant largely because of the availability of a water supply from the Provo River project.

That plant got into production in the late months of the war, but, more importantly, it is now functioning as a whole new industry which is providing jobs for thousands of people.

The Fryingpan-Arkansas project on this side of the mountains is equally important, or even more so, in that it would stabilize and permit further expansion of an already established industry.

Another project of this multiple-purpose project which is of major consequence is the hydroelectric power which will be generated from 7 plants having 104,800 kilowatts of installed capacity. Industry feeds on energy, and this additional power capacity will be a big dose of vitamins to the body politic of the Pueblo industrial area.

In connection with hydroelectric power production from a multipurpose reclamation project, I am amused at the way in which the professional antireclamationists have changed their tune.

In the old days, when such projects as Hoover, Shasta, and Grand Coulee Dams were proposed, these people sounded the pessimistic note that such quantities of power as would be produced could not possibly be used. They argued that the projects which depend largely upon the revenue from the sale of power would be nothing but white elephants in the hands of the Government.

The success of these dams is too well known to need repetition here, but I notice the same purveyors of gloom are now raising a cry of alarm that hydroelectric facilities will be put out of business in a few years by nuclear powerplants, hence it would be silly business to build the hydroplants now.

I cannot reconcile this with the attempts the private utilities are making to gobble up most hydroelectric power sites yet proposed for their exclusive use in the development of power.

The Atomic Energy Commission has forecast that it would be many years before nuclear energy would be produced on a competitive basis with steam generation, and competent engineers have added that hydroelectric power would always be important because of its peculiar importance in handling peak loads of energy demand.

It is for these reasons that we believe the Fryingpan-Arkansas project should be authorized and we so recommend in endorsing House bill H. R. 412.

RESOLUTION ADOPTED BY THE 18TH ANNUAL CONVENTION, PENNSYLVANIA CIO COUNCIL MARCH 15–17, 1955

Whereas the national well-being requires the earliest maximum development of natural resources throughout all regions of this country; and

Whereas the national CIO has urged support of national programs for reclamation, irrigation, and power development; and

Whereas affiliated bodies and the National CIO Convention have endorsed the fullest development of the high dam at Hells Canyon on the Snake River in the Northwest; the upper Colorado storage project including Echo Park Dam; the Fryingpan-Arkansas diversion project, to benefit the steelworkers in Pueblo, Colo.: Now, therefore, be it

Resolved, That the Pennsylvania State CIO urges the Federal Government and the Congress to take early steps to secure authorization and appropriations for the earliest possible construction of these projects; and be it further

Resolved, That copies of this resolution be sent to all member of the Pennsylvania delegation in the Congress and to members of the Interior Committees of both Houses of Congress.

Mr. ASPINALL. Which one of you gentlemen must leave town?

Mr. WHITE. I do.

Mr. ASPINALL. Is there any questioning of Mr. White?

If there is no questioning, you are excused. As we meet at 2 o'clock, you other three gentlemen will please present yourselves at the witness table at that time.

The committee now stands in recess until 2 p. m.

(Whereupon, at 12 noon, the subcommittee recessed to reconvene at 2 p. m., of this same day.)

AFTERNOON SESSION

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will now be in session for further consideration of H. R. 412.

At the time of recess, we had at the witness stand Messrs. Goodman, Frazier, and Morrison, speaking for labor and their endorsement of this project. At that time the chairman had excused Mr. George White from further questioning, as nobody wished to question him, but he asked the other three gentlemen to return for such questioning as the members of the committee desired to make.

The Chair has a communication submitted by the executive board, Colorado State Federation of Labor, under date of April 22, 1955, with a request that it be made a part of the hearings. Unless there is objection, it is so ordered.

(The material referred to follows:)

RESOLUTION

Whereas the 59th annual convention of the Colorado State Federation of Labor adopted, by unanimous vote, Resolution No. 14 regarding the full development of the Colorado River, and

Whereas the Water Development Association of Southeastern Colorado has been promoting congressional approval of the Frying Pan-Arkansas project which would provide additional irrigation water to thousands of wind-swept acres of farmland in the Arkansas Valley, and

Whereas every community in the Arkansas River Basin in Colorado has been plagued with inadequate domestic water supplies: Therefore be it

Resolved, That the executive board of the Colorado State Federation of Labor assembled this 22 day of April 1955 in Denver, Colo., does hereby endorse and pledge its full and complete support for congressional authorization of the Frying Pan-Arkansas diversion project introduced in the Senate as S. 300 and in the House of Representatives as H. R. 412; and be it further

Resolved, That copies of this resolution be sent to each Member of the Senate and House of Representatives from the State of Colorado, to the Governor of the State of Colorado, to each member of the House Interior Subcommittee on Reclamation, to the Water Development Asociation of Southeastern Colorado, and to the press.

Submitted by:

EXECUTIVE BOARD, COLORADO STATE FEDERATION OF LABOR.

Concurred in Colorado State Federation of Labor executive board meeting April 22, 1955.

Mr. ASPINALL. The Chair will advise his colleagues that it is not signed, but the letter of transmittal showed the proper source.

As I understand it, labor in Colorado generally, and the CIO organization, as testified to by Mr. Goodman, supports without qualification the legislation now before this committee; is that correct, gentlemen?

Mr. GOODMAN. That is correct.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Hosmer, if he has any questions.

Mr. HOSMER. No questions, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

Mr. CHENOWETH. Mr. Chairman, I have no questions. I merely want to congratulate each one of these witnesses. We appreciate the support labor is giving to this project.

Mr. ASPINALL. The Chair wishes to join in the remarks of Congressman Chenoweth, giving particular attention and recognition to

the work of Mr. Goodman. Mr. Goodman has been working most diligently not on this particular project alone, but on other projects which have to do with the building of the West.

There is at least some change of attitude from what the position of labor has been heretofore on some of these matters. It has changed around to a more favorable position, and those of us who come from reclamation areas in the West are appreciative of the changed positions that have taken place.

Mr. GOODMAN. I want to thank the members for the kind remarks just made.

Mr. ASPINALL. The Chair will ask you to remain at the witness table, because Congressman Saylor may have a question or two to ask.

Mr. SAYLOR. Mr. Frazier, your position in this matter is that as a representative of your local union and as a resident of Pueblo, Colo., you are interested in this project going through?

Mr. FRAZIER. Yes, sir.

Mr. SAYLOR. As to the manner in which it is handled, are you interested in any of the particulars of it, or just the overall project?

Mr. FRAZIER. Just the overall project, sir.

Mr. SAYLOR. If it is shown that possibly this can be eliminated or other parts of the project could be added, what would your position be?

Mr. FRAZIER. As long as it accomplishes the same purpose as intended now, I do not know that I would have any objection to it, or not. I mean, I don't know what you are referring to.

Mr. SAYLOR. Well, there is some contention, Mr. Frazier, that certain parts of this project might be eliminated and other parts might be added. So the thing that I am trying to find out from you is whether or not it is the project as it stands right now that you are in favor of, or whether or not you are in favor of a project for the district.

Mr. FRAZIER. I believe, in answer, sir, I would have to stand for the project as it stands right now. Because I don't know what particular changes you might have in mind.

Mr. SAYLOR. And, Mr. Morrison, the same question to you. You are a resident of Pueblo; is that correct?

Mr. MORRISON. I am a resident of Colorado Springs, sir. However, my local is Pueblo, and I do have a little, shall I say, different approach to the thing than he. I, as you know, represent the American Federation of Labor for the State of Colorado, the west slope and the east slope. We have studied this project since nearly the beginning. In fact, I myself have been on this for 9 years. We have very carefully tried to weigh the whole thing and see that it is fair to both slopes. Because after all, I have people on the western slope and I have people on the eastern slope.

We, at our last meeting, which we have annually, endorsed this project. As to the east and west slopes togethter, the labor organization endorsed the whole thing as it stands right now, sir.

Mr. SAYLOR. Now, Mr. Morrison, there are representatives from the western slope that maintain that within the foreseeable future. all of the water which the State of Colorado is allocated under the Colorado River Compact and the Upper Colorado River Compact can be put to beneficial consumptive use on the western slope. If that is true, would you still be in favor of diverting a portion of that water to the eastern slope?

Mr. MORRISON. Let me answer that in this way. We, as I say, have made a thorough study of this thing. And we feel that the western slope has adequate water to take care of their demands and also give us this amount of water, without hurting anyone on the east or west slope. We have weighed that very carefully, sir.

Mr. SAYLOR. All right, sir. Now, the next question is for Mr. Goodman.

When was the meeting in Philadelphia, Mr. Goodman?

Mr. GOODMAN. The meeting in Philadelphia was on the 17th of March 1955.

Mr. SAYLOR. And who were present at that meeting?

Mr. GOODMAN. The resolutions committee of the Pennsylvania State Industrial Union Council.

Mr. SAYLOR. And who is on that resolutions committee?

Mr. GOODMAN. I would have to get the names for you.

Mr. SAYLOR. Roughly, how many members?

Mr. GOODMAN. Oh, now you have me. I would guess about 17.

Mr. SAYLOR. And since all of these three projects which they endorse happen to be, none of them, in Pennsylvania, who presented the facts to them?

Mr. GOODMAN. I did.

Mr. SAYLOR. Was there anybody there to say that there was another side to the picture than the one you presented?

Mr. GOODMAN. You are assuming, sir, that I presented only one side. In my opinion, I presented all the facts to them.

Mr. SAYLOR. The reason I asked that question is that I happen to know someone who was at that meeting. He has been to see me to find out the other side of the story, that is the way he put it.

Mr. GOODMAN. You mean your side?

Mr. SAYLOR. I do not know whether it is my side, but I understand that there are two views on each one of these very controversial projects.

Mr. GOODMAN. I would think there are more than two views, sir.

Mr. SAYLOR. Well, I did not want to object to having this made part of the record, but since it is in, again you come to the situation where you are going to tie the Fryingpan-Arkansas project up with Hells Canyon and the upper Colorado River storage projects. Now, I have been attempting to avoid that issue with my good friend, Mr. Chenoweth, but I would like to know, first, why you have included the statement here, "The upper Colorado River storage project, including Echo Park Dam."

Mr. GOODMAN. I think that is very simple. In the past, the CIO, the National CIO Committee in this field, had opposed Echo Park Dam. And when they held the meeting in Denver that I referred to in my statement and heard the full facts in the case, they determined to change their position, and so announced publicly. And because of that previous objection to this particular dam, it was felt desirable that whenever we stated the support of the upper Colorado River storage project, we include the phrase "including Echo Park Dam."

Mr. SAYLOR. What would be the effect upon the CIO, since they have held their meeting in Denver, when the Bureau of Reclamation now takes the position that Echo Park Dam is not an indispensable part of the project, and the uses that can be furnished by Echo Park Dam can be supplied by alternate sites?

Mr. GOODMAN. Well, sir, the CIO didn't base its position on the facts presented solely by the Bureau of Reclamation. We have taken their information into consideration, along with information which came to the committee from leading experts in the field, and they were persuaded, when the committee voted, that this was the essential dam to make the upper Colorado River storage project the most economic. The committee voted on that basis, and I do not think that they would necessarily be influenced by a change in the present administration of the Bureau of Reclamation.

Mr. SAYLOR. Well, the Bureau of Reclamation, up until the present administration, never brought this project in; it was never brought in under any prior administration. And this administration has, within the past two sessions, changed its views.

Mr. GOODMAN. If you are referring to the upper Colorado storage project, I am inclined to think you are not completely accurate, because I believe that the initial report to the Congress was filed by Mike Straus, Commissioner of Reclamation under the previous administration.

Mr. CHENOWETH. Mr. Chairman. Point of information.

Mr. ASPINALL. The gentleman will state his point.

Mr. CHENOWETH. This is a hearing on the Fryingpan-Arkansas project. The gentleman from Pennsylvania is now going into another project.

Mr. ASPINALL. The Chair will have to suggest to his colleague from Colorado that Mr. Goodman did bring this question in, about the total program for the West, and he thinks the gentleman from Pennsylvania has the right to question, shortly, at least, on these different matters; keeping in mind at all times that the Echo Park Dam project is not a part of the Fryingpan-Arkansas project and has no bearing whatsoever with the exception of the exchange of water to be used in western Colorado.

With that exception, the gentleman from Pennsylvania will proceed.

Mr. SAYLOR. I think, Mr. Goodman, you are correct. The original planning report was filed in 1947 by Mr. Straus. I think it is referred to as House Document 419. However, the Bureau of Reclamation, under Mr. Straus, never came to Congress and suggested the building of any of those projects. And it was not until the present administration, the present Commissioner of Reclamation, that the Bureau came up here and requested the construction of the so-called upper Colorado storage project and participating projects. Now, they have changed their views materially.

First, I say to you that they still believe that Colorado should put to beneficial consumptive use the waters allocated by the upper Colorado River compact. And with that I agree. The only difference between anyone that I have found is the manner in which it shall be put to use, and the places that it shall be put to use.

Now, your great organization has said that they are in favor of reclamation. And I commend them for it. And I commend you for your position on it.

Mr. GOODMAN. I am only a hired employee, sir.

Mr. SAYLOR. No, Mr. Goodman. You are more than a hired employee. You are a policymaker for the CIO.

Mr. GOODMAN. No; I am not. The policy for the organization is made fundamentally by the constitutional convention, and between conventions, by the executive board, which has allocated this function to our national committee, whose names I read into the record earlier.

Mr. SAYLOR. And of that national committee, you are the secretary?

Mr. GOODMAN. I am the secretary. But you don't know my chairman, sir.

Mr. SAYLOR. I do know your chairman. And I know some other members on that committee. And I have had very friendly relations with them, and with you, and propose to continue to have them in the future. So the question that I want to ask here now is whether or not you are to give this committee to understand that as to Hells Canyon, you are in favor of the bill presented here a number of years ago for a high dam.

Mr. ASPINALL. Well, now, the Chair is going to have to suggest to the gentleman from Pennsylvania that that issue is not before the committee here. We are not going to take up any time on Hells Canyon.

Mr. GOODMAN. If it pleases the Chair, however, I would like to respond in this way.

Mr. ASPINALL. You do so at your own peril. Go ahead.

Mr. GOODMAN. The chairman of the committee, Mr. Knight, appeared before the Senate Committee on Interior and Insular Affairs and filed a statement in support of S. 1333. Likewise, we have issued a statement in support, that is, the chairman of the committee issued a statement in support, of the upper Colorado River storage project, including Echo Park Dam. We have testified in the House and the Senate in favor of the bill pending before you here today. We hope that the committee will also give consideration to bills that are pending in regard to the Trinity River project and other matters of a similar nature, including the saline water project, which this committee passed, and which has had our strongest endorsement.

So we do work generally in this field. And where we find, as I said in the statement I read, the basic principles that our committee has endorsed in a reclamation proposal, CIO will ardently support the program.

Mr. SAYLOR. Well, might I ask you whether or not your organization supports the reclamation law of 1939 as it is on the books at the present time?

Mr. GOODMAN. I do not recall that our committee ever voted to support the specific existing law. They have voted in regard to principles, which were enunciated both in Mr. Knight's statement before the Senate committee, and which I attempted to summarize here today. But I can't answer the question you ask, because we have never taken that kind of action.

Mr. SAYLOR. The reason I ask you, Mr. Goodman, is that the reclamation law at the present time says that the placing of water upon land is the primary function of the Bureau of Reclamation, and that they shall only be authorized to go into multiple-purpose projects, where those other features which have been described, in this and other bills, are incidental to the placing of water on land.

Now, with that background, I would like to know whether or not you feel that this bill in particular, now, the Fryingpan-Arkansas bill, which we are discussing, complies with that general principle.

Mr. GOODMAN. I believe it does. I believe that its fundamental purpose is to end the arid condition in part of the Arkansas Valley, which now is short of water; and that incidental to securing that water is the electric power use to which falling water can be put.

Mr. SAYLOR. I have no further questions.

Mr. ASPINALL. Has the gentleman from Utah any questions?

Mr. DAWSON. No questions. But I would like to congratulate you, Mr. Goodman, and the CIO, for taking this forthright stand; and I refer not only to this project, but to the upper Colorado and the other projects that you have investigated. It occurs to me that labor unions do have a definite responsibility for expressing themselves on these projects. Some people have the view that perhaps only farmers are concerned with this matter. But I particularly want to commend you for your observation that these plants that you people have so many of your members working at are also directly connected with the welfare of other sections of the country. And on the upper Colorado, where you have taken the time and the effort to go out and investigate for yourselves and give the support you have, I want you to know it is deeply appreciated.

Mr. GOODMAN. Thank you very much.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado.

Mr. CHENOWETH. Mr. Chairman, our next witness needs no introduction to this committee, and I think I would rather defer to you, Mr. Chairman, to introduce him. He is Mr. Dan Hunter, a man revered by everyone in Colorado, so far as I know, a man with long experience in water matters, a former member of the Colorado River Conservation Board, active in REA, and I think dean emeritus of the Colorado State Water Conservation Board. He has so many titles I cannot remember them all.

Mr. ASPINALL. He is too active to have an emeritus title, as far as that is concerned.

Uncle Dan, as we have been calling you throughout all of the West, and particularly the Fourth Congressional District of Colorado, we are glad to have you before this committee.

I will say to the members of the committee that Mr. Hunter is formerly a schoolteacher in Texas. He found out there is a better place to live, and he went to Colorado and has been dwelling in Colorado ever since.

STATEMENT OF DAN B. HUNTER, DOVE CREEK, COLO., PRESIDENT, SOUTHWESTERN CONSERVATION DISTRICT

Mr. HUNTER. Thank you, Mr. Chairman.

My name is Dan B. Hunter, my address is Dove Creek, Colo. I am dean emeritus of the Colorado State Water Conservation Board, president of the Southwestern Conservation District, which comprises eight counties lying within the great San Juan Basin. I also represent in an advisory capacity the State of Colorado on the National Rivers and Harbors Congress. I am also legislative chairman of the Upper Colorado Grass Roots Committee for Colorado.

I have resided in Colorado for 35 years. In appearing before your august assembly I am making no recommendations with respect to the availability of water for large transmountain diversions from the western to the eastern slope of Colorado. However, I do recognize

that there is urgent need in Colorado for supplemented water supplies in the Arkansas Valley. This need is particularly true concerning domestic and municipal purposes. I do not wish that any statement which I may make to be construed to mean that I am committing myself as agreeing to the second phase of what is known as the Gunnison Arkansas project or the potential Blue-South Platte project. I do favor the Fryingpan-Arkansas project as an independent development.

In my opinion this transmountain Fryingpan-Arkansas project will not deplete the stream flow of the Colorado River to an extent that will impair the right of delivery of 75 million acre-feet of water at a point on the river, known and designated as "Lee Ferry" through a 10-year period as called for under the 1922 Colorado River compact.

I am aware of the fact that this compact allocates the bottom half of the flow of the Colorado River to the three lower basin States, while the four upper basin States must be contented to put to use the erratic flow of the stream. This being true, I opine that the Fryingpan-Arkansas project will in a measure aid and assist in regulating the peaks and valleys of the Colorado River.

We are all aware that a considerable storage capacity will be necessary in order ot carry water over from wet years to dry years if the delivery of water to Lee Ferry under the 1922 compact is consumated, and the commitments to the Republic of Mexico fulfilled. I fully realize that every drop of water in the Colorado River and its tributaries, is highly significant, since the potential demands will far exceed the percentages of the 7,500,000 acre-feet allocated unto the upper-basin States. Within the past 3 years it has been ascertained that it is potentially possible to utilize a great amount of water on the western slope of Colorado for the development of synthetic fuel, hydrogenation of coal, pulp-paper factories, and other developments.

I am deeply interested in the development of the natural resources of our State; however, I feel that I would be remiss in my duty as dean emeritus of the Colorado State Water Conservation Board, and as President of the Southwestern Conservation District, chairman of the Upper Colorado Grassroots Legislative Committee of Colorado, if I did not recommend that the Fryingpan-Arkansas project be constructed as soon as possible. I assure you that I am moved by no motive other than the good of Colorado as a whole. The replacement storage reservoir at the Aspen Reservoir site, with an active capacity of 28,000 acre-feet, a part of which is in excess of replacement requirements will be available for future use in meeting usage demands in western Colorado, which, in my opinion, is sufficient compensation for the transmountain diversion known as the Fryingpan-Arkansas project.

The Colorado State game, fish, and wildlife are satisfied with the maintenance of the streamflow as outlined in the project for the Fryingpan River, while the loss and damage to the Roaring Fork River and its tributaries above the Aspen Reservoir from diversion of these streams will be prevented by extending the Hunter conduit to the south fork of Hunter Creek and the enlargement of the tunnel from Chapman Gulch to the east end of the Fryingpan-Arkansas Tunnel.

As a member of the executive board of the Colorado State Association of the 23 Colorado REA State co-ops, naturally I am deeply

interested in seeing that this project be developed to completion, since the project will withhold approximately 135,000 acre-feet of storage water for the development of electric energy, which will produce 400 million kilowatt-hours of electric power annually. It is useless for me to comment as to the need of this power, since your committee recognizes this need at the present time, saying nothing concerning future potential possibilities; 15,000 acre-feet of this project water is needed immediately for municipal purposes in the cities of Colorado Springs and Pueblo, as well as a number of valley towns located between Pueblo and the Kansas State line. The future municipal potential needs for these cities and towns, approximates 53,000 acre-feet annually.

Definitely, in my opinion, as much of this water as economically feasible should be earmarked for municipal purposes.

In conclusion may I say that I am a farmer and for the past 35 years the hungry Colorado winters have congealed my blood like the ice upon our lakes and rivers. During these years my plowshare did break the stubborn sod locking the golden sunshine in the furrow with the fond expectancy of a glorious harvest. Lands were then to be had for the asking, and our houses were built from logs hewn in the forest. Ours was a desolate desert land where the mountains lift through the snows their lofty and luminous summits. Where the elk and the antlered deer wandered over the hills until they were weary of travel and would lie down to rest; and the brown cinnamon bear, the anchorite monk of the forest, climbed downward to the abysmal depths of our canyons to dig for roots and herbs buried along the banks of our streams.

I reside on the western slope of Colorado. My geographic location is such that I am naturally inclined to oppose any transmountain diversion of water from the western to the eastern slope of Colorado. I am but human, therefore my first thought naturally would be to conserve and develop the waters of the Colorado River and its tributaries for the benefit of those of us who reside west of the Rocky Mountains. But as dean emeritus of the Colorado Water Conservation Board and as president of the South Western Water Conservation District, I am also deeply interested in the greatest good for the greatest number of people, therefore I am submitting this résumé in order to focus the points at issue in this project. I assure you that I wish no stars of Bethlehem to hang on my Christmas tree. I do not possess the mind of an angel, nor the soul of a seer. I am only one of those horny-handed sons of toil who enjoys the sentimental delight in gazing upon a reservoir filled with water, where schools of rainbow trout lie hidden like ingots of silver buried in the golden sands of the lake.

I have stood at the headwaters of the Fryingpan and Roaring Fork Rivers, where their tiny trickle flows among the rocks and pinnacles of the great Rocky Mountains in order to swell the floodtide of the Gulf of California. I am now asking that you gentlemen divert the waters of these streams along a most difficult route to the shores of the Gulf of Mexico. Why am I making such a request? In order that thousands of men, women, and children may slake their thirst from the cooling waters of our Rocky Mountain streams.

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The men who grant the construction of this reclamation project will have written history, not upon tablets of stone, but within the hearts of a thirsty people.

Gentlemen, we ask that you hear and heed our small Macedonian cry to "Come over and help us," praying that the multitudinous echo of our voices may not die away in the distance, but may you catch the vision of the golden sun shining upon abundant waters where myriad water lillies rear their head in resplendant beauty like a crown of gold upon the head of some Arabian princess, then our hearts will be filled with love for our fellow men as we usher into the dawn of another heaven; for the construction of this project will unite the majority of the people residing on the western and eastern slopes of Colorado in the bonds of love and friendship, such as we have never known before.

Mr. Chairman, we ask at this time that you extend unto us this magical golden wand in order that we may wave it in the midst of our people who will be touched by the holy fire that will melt and mingle us together.

I thank you.

Mr. ASPINALL. Thank you very much.

I have one question, Mr. Hunter. Do you know the present opinion of the Southwestern Conservation District Board relative to the Fryingpan-Arkansas legislation?

Mr. HUNTER. I do.

Mr. ASPINALL. And what is that opinion, as of this time?

Mr. HUNTER. We have gone on record, Congressman Aspinall, both by resolution and by general consent of the 50,000 people who live in the San Juan Basin, as recommending this project. And I am speaking directly for the Southwestern Water Conservation Board.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania.

Mr. SAYLOR. No questions. I just wanted to congratulate Mr. Hunter for having come here and made this presentation.

Mr. HUNTER. Thank you.

Mr. ASPINALL. The Chair recognizes the gentleman from Utah.

Mr. DAWSON. I just want to compliment you, Mr. Hunter. That is one of the most beautiful expositions I have ever heard on the need for water in the West.

Mr. ASPINALL. May the Chair confide in his colleague from Utah: Uncle Dan can write and talk equally well about all of the beautiful things of nature.

Mr. CHENOWETH. Mr. Chairman, I do not want to take much time, because I know there are a large number of witnesses to be heard, but I just want to say this. I do not think I have ever heard a more impressive or flowery or philosophical statement before this committee. And I am sure that no member of this committee, regardless of what State he comes from, Mr. Hunter, could fail to be touched by your plea for this project. And I am sure no one who heard you today could fail to be moved by your touching appeal for the water which this project will provide. I commend you for your interest in this project over the years, and for your efforts in bringing about a better understanding and good feeling between the people in all sections of our State. You have certainly blazed the trail, Mr. Hunter, and we hope the time

will soon come when we can be in agreement on our water problems in Colorado.

If others would follow the example you have set, that day would soon arrive. As a sponsor of this project, I want to commend you for the wonderful support you have given all through the years. It has been a great pleasure to have you before the committee again.

Mr. HUNTER. Thank you.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado.

Mr. CHENOWETH. Mr. Chairman, we now have the representatives of two of the largest cities, who will participate in this project by receiving municipal water. We have with us Mr. Simon F. Elliot, who is consulting engineer for the water boards of Pueblo, Colo., one of our outstanding engineers, and Mr. J. S. Nichols, superintendent of the water division of the city of Colorado Springs. They will appear together to present their statements of the need for municipal water.

Mr. ASPINALL. The Chair recognizes the gentlemen and welcomes them to the city.

Who shall speak first?

STATEMENTS OF SIMON F. ELLIOT, CONSULTING ENGINEER FOR THE WATER BOARDS OF PUEBLO, COLO.; AND J. S. NICHOLS, ENGINEER, DEPARTMENT OF PUBLIC UTILITIES, CITY OF COLORADO SPRINGS, COLO.

Mr. ELLIOT. Mr. Chairman, for the purposes of identification, my name is Simon F. Elliot. I have been a resident of Pueblo, Colo., all my life, and I am here today in the capacity of consulting engineer for the water boards of Pueblo.

In the interest of brevity, and with your permission, Mr. Chairman, I would simply like to touch on the highlights of the report orally and simply leave the details a part of the record.

Mr. ASPINALL. You may proceed.

Mr. ELLIOT. The city of Pueblo secures most of its water from the Arkansas River, and it has some 53 second-feet of water as its direct flow decree from the Arkansas River. This represents practically all of the water that the city of Pueblo uses as its domestic water supply.

In the 1920's, it became apparent that the decrees which it had by original construction, these some 53 second-feet of water, were fast becoming inadequate. As a result, the water boards of Pueblo have tried from time to time to secure additional water by purchasing other water rights along the Arkansas River.

The city has had very little success in doing this and has, on several occasions, been refused by the courts the right to make transfers of the direct water decrees. This procedure was tried as late as 1950 and met with little success.

Since the city could no longer, apparently, obtain direct flow decrees by purchase, a program was embarked on to bring water to the western slope by means of ditches. In the early 1930's, the Wurts ditch was acquired by the city, which transports some 2,000 acre-feet of water from the western slope to the upper reaches of the Arkansas. Along about 1930, during the severe drought years, the Arkansas River actually ceased flowing in Pueblo. Emergency wells were sunk in the river bottom and tided the city over at that time, and also from time

when water supply was short. However, those wells represented no new water to the city. It was simply the underground water of the Arkansas River.

Several years ago, the city purchased the Columbine ditch, which also transports water from the upper reaches of the Eagle River to the upper reaches of the Arkansas River.

The city further attempted to drill wells of a deep nature in attempts to secure water. This was done about a year ago. The water that was obtained from these wells is highly mineralized and has a bad taste, and when the river is low considerable objection is raised to it. However, a little water is better than none in time of drought.

The city finally, in desperation, about a year ago, entered into negotiations with the Otero Canal Co. and was successful in acquiring another transcontinental ditch, the Ewing ditch, and also secured the Clear Creek Reservoir, which develops on an average, over a 50-year period, about 5,000 acre-feet of water. It was with a great deal of reluctance that the water board acquired these rights, because it meant that it was going to put certain irrigation interests out of business. However, it was a necessity that the city acquire additional water, and they went ahead and made the purchasse of the Clear Creek Reservoir and the Ewing ditch at a cost of about $2,700,000.

The city has so far been able to keep just a little bit ahead of the water situation, and they have spent a great deal of money in improving their distribution, pumping, and treating facilities. Over the past 20 years, the city has spent approximately between 4 and 5 million dollars in purchase of additional waters and the improvement of their system.

In addition to trying to obtain more water, the water boards have embarked upon a program of conservation and have put very stringent irrigation rules into effect, limiting irrigation to some 7 hours every other day. The problem of metering has come up, and they have made a start toward metering the city. Owing to the great cost of metering, which is conservatively estimated to be about a million dollars, this program will have to proceed at a rather slow rate, due to the financial question.

Certain types of plumbing have been outlawed in the city, and other restrictive measures are contemplated concerning air conditioning and other uses of water. We have come to the conclusion that we are up to the limit in developing what water is available, and even with conservation measures, steps will have to be taken to secure water from the western slope. It is the concensus of opinion of the water boards that the most practicable way to increase the municipal supply is by means of the Fryingpan project.

That, in brief, gentlemen, is the statement which I have submitted for the record.

Mr. ASPINALL. Thank you very much. Unless there is an objection, the entire statement will be placed in the record.

Hearing none, it is so ordered.

(The statement referred to follows:)

STATEMENT OF SIMON F. ELLIOT, CONSULTING ENGINEER FOR THE WATER BOARDS OF PUEBLO, COLO.

For the purposes of identification, I am Simon F. Elliot; I have been a resident of Pueblo, Colo., all my life, 46 years, and have been retained as consulting engineer for the water boards of Pueblo about 7 years. I am a registered pro-

fessional engineer both in Colorado and New Mexico. I have been practicing civil engineering since 1932.

HISTORY OF THE WATER BOARDS OF PUEBLO

Pueblo has two water districts, both quasi-public bodies, one north of the old Arkansas River Channel, known as Pueblo Water Works, District No. 1, and one south of the old Arkansas River Channel, known as Public Water Works, District No. 2. Omitting a great amount of historical detail, which is immaterial to this statement, district No. 1 is an outgrowth of the original town of Pueblo; district No. 2 is a result of the formation of the district by State statute in order to purchase the system from a private water company operating in that sector of the city.

The city charter, which was in effect until early 1954 recognized the two water districts as above. However, the charter was very restrictive, and because of this, any attempts at a consolidation of the two districts, or the management to be taken over by the city, were futile. In addition to these difficulties, considerations of comparative physical condition, debt obligation of each, etc., further complicated any consolidation move.

Early in 1954, a new charter was adopted by the city. This set up the necessary machinery for an eventual orderly consolidation of the two districts. It is felt by many Puebloans that this consolidation of the two districts may not be far in the future.

PRESENT POLICIES OF THE TWO WATER DISTRICTS

It has been apparent that in the past few years, the two districts have been acting as a team. In 1953 they jointly financed an engineering survey to determine methods of obtaining safer and better water for the city, and to obtain recommendations to ascertain possibilities of operating a joint treatment plant, and if this were not possible, alternate recommendations were requested. As a result of this joint survey, both districts now participate in one laboratory for the testing and control of the water supplies, and for a continuing research beneficial to both.

In order to correlate a great many of the engineering problems common to both districts, one consulting engineer is retained to serve both districts. Another example is that both districts utilize one supplier of chlorine gas. Joint meetings of the two boards to discuss problems common to both is a regular occurrence. The operating personnel of both districts are always prepared to, and many times do, assist each other in the event of an emergency. In times of water shortages on the river, the two boards cooperate with each other to the fullest. Thus, although two districts serve the city of Pueblo, their activities point to a common purpose.

WATER SUPPLY

Both water districts obtain almost their entire supply of water from direct flow decrees out of the Arkansas River. The total of these decrees is equivalent to about 34.4 million gallons per day, or about 53 cubic feet per second. These rights were acquired by original construction or by purchase of small irrigation rights. These rights proved adequate until the 1920's, at which time attempts were made to purchase additional rights in the Canon City and Florence areas, but were refused by the courts. Another attempt to purchase direct flow rights was instituted in 1950, but again met with failure.

The records will indicate several occasions when the river at Pueblo gaging station (district No. 2's intake structure) has actually ceased to flow. During 1934, the river flow was so reduced for a sustained period, that emergency wells were sunk in the river bottom to alleviate the crisis. This water, although from underground sources, is still part of the river's water, and represents no additional supply. The three wells are still operated on a standby basis, and were operated during last year's severe water shortage.

During the winter months, the average pumpage is about 14 to 16 million gallons per day. During the summer months, an average day's pumpage would be 3 times this amount, or in the vicinity of 40 million gallons. Peak demands at times even double this amount. Since both districts have very little storage facilities available locally, it is extremely difficult to operate, and in fact at times impossible to stay within the decreed amounts allocated the districts.

ADDITIONAL WATER ACQUIRED

The water districts, realizing that purchase of additional rights on the Arkansas River is practically impossible, have been making every attempt possible within their financial means to find alternate means of securing additional water supply and storage facilities. In the early 1930's, the Wurts ditch was purchased. This delivers an average of 2,000 acre-feet of water from the Eagle River across the Continental Divide at Tennessee Pass. Until last year, this water has been stored by agreement in Sugar Loaf Reservoir at Leadville. The water developed by this ditch has augmented the city's water supply when direct flow decrees are exceeded.

In 1951, the Columbine ditch was acquired. This ditch crosses the Continental Divide at Climax, Colo., and averages a delivery of some 1,000 acre-feet per year from the upper reaches of the Eagle River, to the West Fork of the Arkansas River. Extensive surveys will be made this year to ascertain possibilities of extending this ditch. The cost of these surveys and investigations will be borne by the district.

Extensive surveys have been conducted to explore the possibilities of tapping underground sources of water not tributary to the Arkansas River. As a result, 3 deep wells have been sunk at Swallows, Colo., about 18 miles west of Pueblo. The wells are artesian, but have to be pumped to develop maximum efficiency. The water has a very high mineral content. At times when the Arkansas River is at low stage, and when the water is needed, these wells are placed into service to augment the city's water supply. A highly disagreeable taste is imparted to the drinking water of the city. However, in times of water famine such as is being experienced, a bad taste in the water is far better than no water at all.

In January 1955, at a cost of nearly $3 million, Ewing ditch and Clear Creek Reservoir were acquired, this adding to the water supply some 5,000 acre-feet of water per annum, and providing much-needed storage space. Ewing ditch crosses the Continental Divide at Tennessee Pass, delivering Eagle River Water into the upper reaches of the Arkansas River. Clear Creek Reservoir has a storage space of some 11,000 acre-feet, located as the name implies, on Clear Creek, approximately 140 miles above Pueblo. In acquiring these two structures from the Otero Canal Co. of La Junta, Colo., the city acquired an additional water supply at the expense of agriculture, and it is highly probable that most of the 9,000 acres of land under cultivation under the Otero Canal system will be returned to grazing or prairie lands. It was only after considerable study that this purchase was made, but in spite of acquiring water to the detriment of agriculture, steps had to be taken to secure additional water.

All of the acquisitions thus far mentioned, i. e., the wells, the Wurts ditch, Columbine ditch and Ewing ditch, and the Clear Creek Reservoir, can all be integrated in the overall development contempated in the Fryingpan-Arkansas project. A capital expenditure in excess of $4 million dollars is represented by these acquisitions.

TREATMENT AND DISTRIBUTION EXPANSION

Since 1932, almost 50 miles of new mains have been installed, ranging in size from 4 to 42 inches. At the present time, contracts are being let for main extensions varying in size from 6 to 42 inches, with a footage greater than 6 miles, at a cost of nearly a million dollars.

Three new pumping stations have been built since 1949, having a total capacity of nearly 20 million gallons per day. In addition to this, standby-pumping capacity has been installed having an additional capacity of 20 million gallons per day, not included above.

Contracts are presently being let to provide additional pumping capacity for an additional 23 million gallons per day. Improved treatment of the raw water by means of additional flash mixing, flocculation and sedimentation, plus improved chemical feeding, is now being completed. By the end of 1955, 3 elevated steel water towers will have been erected having a total storage capacity of almost 3 million gallons.

All of these improvements, the new pumping stations, additional mains, elevated storage towers, improved treatment, and the many accessories attendant upon all, will represent an expenditure conservatively estimated to be $5 million.

CONSERVATION MEASURES

From 1950 to the end of 1954, the population served by the boards increased nearly 20,000, and the accounts of the water boards increased 20 percent. Expansion of plant facilities has had a difficult time keeping pace with this in-

crease, as evidenced by the large expenditures made, outlined above. The acquisition of additional water as outlined has not been able to keep pace with increased demands, in spite of the fact that conservation steps have been taken.

Late in 1954, all hopped type toilets were outlawed. It is true that this type of plumbing is outmoded, but in taking this step, considerable hardship has been inflicted, as the owners of this type of fixture are mostly of the lower-income groups, and in the poorer sections of the city. However, in taking this step, thousands of gallons of water per day are being saved.

Irrigation of lawns, etc., has been restricted to 7 hours per day, every other day, during the growing season. Publicity advanced by the water boards has made the people conscious of the water scarcity. The entire city is policed by inspectors and violations are kept at a minimum. Failure to comply with regulations results in shutting off the water service, and a fee to reconnect.

A 50 percent increase in present water rates will go into effect on April 1, 1955. Most of this increase is to provide for debt retirement. Under consideration at this time, the boards are hoping to include in this new rate structure a new set of regulations, among which will be the metering of all nonconserved water-cooled air-conditioning. New meter rates incorporated into the new rate structure will be such as to permit 100 percent metering of the city at such time in the future when this decision has to be made.

It is felt by the water boards that a few years ago, public opinion would not permit metering of the entire city, but due to the public becoming more and more aware of the acute water shortage, a metering program in the not too far future will be acceptable. Another problem confronting the boards regarding metering is the fact that it will cost in excess of $1 million to meter the entire city.

SUMMARY

In conclusion, the city of Pueblo is in desperate need of additional water to meet both present and future needs. The water boards have acquired about all the water over and above their decreed amounts that is financially possible to obtain. It is also a financial impossibility to provide ample storage space for long carryover of city water, as it is our opinion that in order to provide ample space for this water, and also have a site on the main stem of the Arkansas River relatively near Pueblo, the reservoir must be multipurpose, a project beyond the reach of just the water boards.

The amounts of money spent by the water boards in securing all the water possible, and the large amounts spent in making improvements to the systems, certainly indicate their willingness to do all that is possible first, before seeking the assistance of the Federal Government, in the form of the Fryingpan-Arkansas project.

We have determined, through careful analysis of the growth of our districts and the efforts made to meet the demands, that within 8 to 10 years the two Pueblo water districts will need approximately 5,000 acre-feet of additional water annually. It is our understanding that the project is based upon the ultimate utilization of that much water by Pueblo.

On behalf of the water boards of the city of Pueblo, I respectfully urge your committee to give this project your full and favorable consideration.

Mr. ASPINALL. We will now listen to the statement of Mr. J. S. Nichols of Colorado Springs.

Mr. NICHOLS. I am J. S. Nichols of Colorado Springs. I have a prepared statement for the committee, for the city of Colorado Springs, and with your permission, Mr. Chairman, I would also like to submit for the record the statement of the Colorado Springs Chamber of Commerce, which was to be submitted by Mr. Clayton J. Banta, secretary-manger of the chamber of commerce, who was here for the hearing but was called back because of an urgent matter.

Mr. ASPINALL. Very well. You may proceed.

(The statement referred to follows:)

STATEMENT OF CLAYTON J. BANTA, SECRETARY-MANAGER, THE COLORADO SPRINGS CHAMBER OF COMMERCE

Colorado, among all the States, has long been known as the watershed State of the Nation. Rivers originating in Colorado are the Colorado, the Arkansas, the Republican, the South Platte, the Rio Grande, and a portion of the North Platte.

From these Colorado rivers, the resource of water is of paramount importance to many millions of Americans. Farmers, ranchers, city populace, municipal entities, industrial people, laborers, sportsmen, tourists, and the everyday American businessman have a united concern about water-producing lands, to say nothing about the Coloradan who lives with or without this most essential resource. All our efforts to build sound agriculture, strong and prosperous cities, wholesome homes, flourishing factories, and the better American way of life in Colorado, depend as elsewhere, upon the one great resource of water. This is the resource that limits the size of cities, the prosperity of industry, the stability of farms, and above all, the beginning of good strong democracy and government. Other resources that come from these lands may aid in the occupancy, development, and uses of the areas, but water alone makes possible the profitable use of the other resources.

It is highly significant and of important coincidence that the lands of Colorado are now producing inestimable quantities of atomic materials, in addition to the life sustaining resource—water.

Early in 1954, in addressing the Central Rocky Mountain section of the Society of American Foresters, in Denver, Colo., J. Selby Young, rancher, conservationist and president of the Colorado Springs Chamber of Commerce, made this statement: "By and large, the public lands of the United States are the last ramparts of the Nation. With the advent of the hydrogen era and all of its promises of death, or the present afterthought of a better life, we must still look to the soil and water resources for our existence. The Rock Mountains, which include expansive areas of public resources, may yet become man's last refuge in atomic warfare. Our mountain public lands would then become survival shelters for millions of our people. These lands of yours and mine possibly will be more life sustaining and appreciated than we can now foresee." Of recent date, regarding this new value of Colorado lands, similar information has been pronounced by the Honorable Val Peterson. The front range of the Rocky Mountains, from Fishers Peak to Pikes Peak, in central Colorado offer survival area to millions of Americans from the Midwest and southern areas of our Nation. Millions of these same Americans who have vacationed in the upper reaches of the Arkansas Valley in Colorado, are now very familiar with the many other values of this refuge for man. For here are the great Pike and San Isabel National Forests. Strategic cross country highways from every direction lead to them. Here in semiarid Colorado, Nature has provided lavish resources, with the one exception—that of water. Yet, this resource exists plentifully just beyond the Continental Divide. Needed only is man's foresight and planning and resultant action to make these waters available to the highly accessible and multiple resource rich Arkansas Valley in Colorado. With ample water, the future of power, agriculture, industry, municipalities, and existing military installations would be assured. It is an undisputed fact that population dispersion, as well as industrial movement, is westward. As recently as July 1953, President Eisenhower, in his conservation message to Congress, had this to say:

"* * * the problems of water resource development in the West are undergoing considerable change. The pattern of Western growth has broadened substantially in recent years. Industrial expansion has been extensive and varied. Increased activities in mineral and fuel processing have occurred. Urban expansion has been well above the national average in many communities. These developments have brought about strong competition for existing water supplies and have stimulated the need for a broader approach in planning new water resource development. As a consequence, the Federal role in the cooperative development of these resources should now be reexamined in the interest of achieving a better program for Western growth."

Reference to the original Fryingpan-Arkansas report of 1951 will show that terrific population increase has occurred in the Pikes Peak region. That report anticipated a population for this area of 63,000 by the year 2000 A. D.

Already, our growth has exceeded 95,000 people, not including military installations. Industry in the Pikes Peak region has grown from practically nothing in 1940, to a $40 million annual payroll in 1955. The present revised estimate by the bureau of business research of the University of Colorado predicts a population of 125,000 people by the year 1950. Colorado Springs and the Pikes Peak region have solved their water problems to date without Government aid. The multimillion dollar Blue River diversion project, paid for entirely by a municipal bond issue, will take care of all of the needs of the community through 1960. However, at that time, the demand will have again caught up with the supply,

and we will need the help of a Government project, such as the Fryingpan-Arkansas, since we will have to go farther away to find new sources of water. Only by the installation of Fryingpan-Arkansas, or like projects, can water supplies of sufficient quantity to match the needs of the increasing population of our area after 1960 be obtained. Without such projects, we cannot expect to maintain stability in our existing economy, much less the same factors required by an emergency.

The Fryingpan-Arkansas does not deprive the Coloradans beyond the Continental Divide of this vital resource, water, since this project makes use of unappropriated spring runoff waters. It does, however, have beneficial uses to thousands of our people who desperately need these surplus waters. Adequate provisions, we feel, are included in the project for the benefit of all public and individual interests. The addition of another 125,000 people in the Pikes Peak region to the Fryingpan-Arkansas project through our having joined the conservancy district broadens the base for repayment on the project.

Millions of vacationists from every State in the Nation use the unmatched recreational facilities of the Arkansas Valley each year. Coloradans likewise use this area for agriculture, timbering, mining, hunting, fishing, and recreation. Uses by both residents and visitors are expanding and causing increased competition for available water supplies.

The overall public interest in Colorado, as well as the Nation, will be served and immeasurably benefited by the Fryingpan-Arkansas transmountain diversion of water. Speaking from the viewpoint of the businessman and the taxpayer, all of the values which this great project entails for the Nation are economical, feasible, and good business.

The Colorado Springs Chamber of Commerce maintains that every American has a stake in the Fryingpan-Arkansas, and the perpetual benefits which will accrue to all of the people underline the importance of making this project a reality.

Mr. NICHOLS. I have been a resident of Colorado Springs, Colo., for 48 years. I have been employed as an engineer in the department of public utilities of the city for a period of 25 years. For the last 6 years, I have been superintendent of the water division of the city's department of public utilities. I am submitting this statement for the city of Colorado Springs, Colo.

Colorado Springs is located at an elevation of 6,000 feet on Fountain Creek, a tributary of the Arkansas River, at a point about 40 miles upstream from the confluence of Fountain Creek and the Arkansas River.

The average annual rainfall at Colorado Springs is 14½ inches, which place the area in the semiarid classification. The dry climate results in a relatively high domestic use of water in the area, amounting to an average use of about 200 gallons per capita per day.

The city has owned and operated its water system since 1878. The upper tributaries of Fountain Creek, originating at high elevations on the south slope of Pikes Peak, were the first sources developed and utilized by the city. Watershed lands were acquired by purchase and by congressional grants.

In the 1890's, the water-collection system was expanded to include the watershed area on the west slope of Pikes Peak in the upper drainage area of Beaver Creek, a small tributary of the Arkansas River.

In the several years following this, the water production capacity of these areas was further developed by the construction of 5 storage reservoirs in the Beaver Creek system and 2 in the Fountain Creek system. The elevations of these reservoirs are all above 9,300 feet, the highest being above 12,000 feet.

In 1907 first steps were taken by the city to acquire and develop the water resources of the north and east slopes of Pikes Peak. Over a

period of 25 years, lands, water rights, and filings were purchased and additional watershed areas were reserved by congressional grants. Dams, diversion works, and pipelines were then constructed and in 1937 the project was completed and in operation, delivering water to the city system.

This completed the picture as far as devolping water supplies from the Pikes Peak watersheds was concerned. The city's engineers immideately began studies to determine where the city should go next for the additional water which would be necessary for continued growth. By 1951 it had been established by the engineers that the nearest point at which there existed unappropriated water which could be feasibly developed and conducted to the city was the upper tributaries of the Blue River system, on the Pacific slope of the Continental Divide, a distance of some 90 miles from the city.

The subnormal precipitation cycle which had persisted throughout the 1930's and which had resulted in the destructive "black blizzards" of that era pointed up the absolute necessity for continued development of new water sources and conservation of existing sources. In 1941 complete metering of all water sold in the city was accomplished to effect conservation. Colorado Springs was the first major city in the State to accomplish 100 percent metering of its water.

The additional water sources developed in the 1930's made it possible for the city to meet the water demands made upon it by the growing community and the substantial military installations which were established there during World War II.

With the end of the war, work was resumed in the development of new water sources. In 1948 negotiations were carried out by the city for the purchase of a decreed water right on the upper tributaries of the Blue River and the acquisition of water filings on these streams which were made several years earlier. Work was begun on the project and has continued uninterruptedly since.

At about this time, the city was advised of the Fryingpan-Arkansas project and the possibility that additional water could be made available to it from the project. A careful study was made by the city engineers and it was determined that in view of the accelerated growth which was taking place, additional water must be developed at a date earlier than deemed possible in the Fryingpan-Arkansas project. The proponents of the project were so advised and the city continued with its own Blue River project.

The city entered an adjudication proceedings in the district court of Summit County, Colo., and in January 1952 was awarded a decree in the amount of 400 cubic feet of water per second of time with a priority date of May 13, 1948, for its Blue River diversion project. The award is conditioned on completion of the project with reasonable diligence.

At that time, 1952, the city's growth was following the pattern established during the war years and projections of this growth indicated that the full development of Blue River water, estimated at 15,000 to 18,000 acre-feet per year, would not be required until about 1962 or later. A program of development in stages was evolved by our engineers, tailored to estimated needs and the ability to finance the construction out of utilities department earnings.

At this point, I would like to advise that the city owns and operates its electric, gas, and sewer utilities, as well as water.

By the end of the year 1953, the construction of the works required for the diversion and delivery to the city of 4,400 acre-feet of water per year, had been completed at a cost of about $3,100,000. This work included the construction of an 8,000-foot tunnel under the Continental Divide, diversion dams and collection pipelines on the western slope, 20 miles of 30-inch pipeline, and 2 pump stations.

Coincidentally with the completion of this phase of the development, new influences were making themselves felt in Colorado Springs. Increased military activity in the area, involving increases in military personnel at Camp Carson; the change to permanent status of Camp Carson and the Air Defense Command, and the selection of the area for the site of the Air Force Academy, were all influences which were producing rapid growth of population in the area.

The comparative security of the area as a refuge in an atomic age was undoubtedly another contributing factor in this accelerated growth. Again, as in the 1930's, a cycle of subnormal precipitation conditions, which had begun in 1950 and continued into 1954, were reducing water supplies from existing sources.

It was evident to the city engineers and officials that the balance of the program of development of the Blue River project must be greatly stepped up to keep pace with demands for water.

This has been done. Work already completed, projects presently under construction, and contracts for which awards are presently pending, will result in the final completion of this project by the end of the year 1956. The project will represent an expenditure of some $11 million, in addition to the $3 million spent on the first phase of the job, all of which is being financed by the city's department of public utilities.

With the completion of the project, the annual production capacity of the city's water system will be about 32,000 acre-feet. Present commitments for delivery of water may be briefly totaled as follows: Fort Carson, 3,000 acre-feet; other military establishments, 1,000 acre-feet; United States Air Force Academy, 5,000 acre-feet; 75,000 population, 16,500 acre-feet; total, 25,500 acre-feet.

The 75,000 population figure does not represent the entire population of the area. There are some 15,000 additional persons served by 3 small water utilities in the area.

Projection of the population growth curve of the city indicates that by the year 1964, the demand for water will have reached the 32,000 acre-feet per year level represented by present and potential sources.

Therefore, the city has been engaged in extensive studies to determine a course of action for future water-supply development. Three specific projects have been studied and evaluated. Each of these projects is substantially equal in scope, as far as the city's participation is concerned. One of these three is the Fryingpan-Arkansas project.

We feel that the Fryingpan-Arkansas project has many features which would make it particularly compatible with the city's requirements. First, the project gives municipal use of water first priority; second, the project is in accord with operating principles agreed upon by western slope water users; third, the project would aid the economy of the entire Arkansas Valley, of which Colorado Springs is a part; and in addition the participation of the city in the project would substantially broaden the base of the project and improve its repayment

capabilities by adding our $69 million in assessed valuation to its conservancy district.

Participation by the city in the project would involve an expenditure of some $8 million for specific works for the city. Recent heavy expenditures on the Blue River project would make this financing difficult for the city. However, if this project is not constructed, the city will find it necessary to construct, in effect, a Fryingpan-Arkansas project of its own, which would impose a tremendous burden on the community.

We point out here that the project presently being submitted for approval is a completely different project from that submitted last year, as far as specific works for Colorado Springs are concerned. At the time original designs were being evolved, Bureau of Reclamation engineers, basing their plans on the population trends in Colorado Springs at that time, included a plan whereby the city could, by an exchange arrangement, procure some 2,700 acre-feet of water annually.

The present project plan contemplates the procurement by the city of 10,000 acre-feet or more annually by a direct diversion.

The city of Colorado Springs has, by ordinance, included itself in the Fryingpan-Arkansas Project Conservancy District.

I have also for the record a map of the State of Colorado, which I would like to submit. It shows the location of the city of Colorado Springs, with reference to the major streams of the State.

Mr. ASPINALL. The map will be accepted as a part of the file. It will not be made a part of the record.

Mr. NICHOLS. It is a map which was prepared by H. R. Tipton.

I will submit my prepared statement and comment on it briefly in order to conserve the time of the committee. The city of Colorado Springs is located in the Arkansas Valley about 40 miles removed from the main stem of the Arkansas River on Fountain Creek, a tributary of the Arkansas. The supply of municipal water for a town located in a semiarid area similar to Colorado Springs is a continuing problem. The Colorado Springs water system, operated by the city, has been in operation since 1878. Systematically, the local supplies, primarily the upper tributaries of Fountain River on Pike's Peak, have been developed until all of those sources were developed and the maximum utilization made of them by providing adequate storage.

In 1941 the city of Colorado Springs was one of the first major cities in the State of Colorado to go to 100 percent metering for conservation purposes.

Approximately 7 years ago, the supplies locally available having been exhausted as far as additional production capacity is concerned, the city's engineers launched themselves on a program of diverting water from the Blue River, a tributary of the Colorado River. That project has progressed continuously since that time, and final elements of that project are presently under construction and will be completed within a matter of 2 years. The total cost of this project has been approximately $15 million, all of which was financed through conventional financing by the department of public utilities of the city of Colorado Springs. In the last 10 years the population trend in the city of Colorado Springs has accelerated greatly. We have also had substantial military establishments located in Colorado Springs. Our present project, which is under construction at this time, will meet the demands of our present commitments and a modest time in

the future, possibly 8 years. At the expiration of that period, additional water will be required, if continued growth of the city is to be permitted. We have studied three separate projects for future development to take care of that future requirement. We have decided that the Fryingpan-Arkansas project best fits the requirements of the city. And I would like to quote briefly from page 5 of the prepared statement:

> We feel that the Fryingpan-Arkansas project has many features which would make it particularly compatible with the city's requirements. First, the project gives municipal use of water first priority; second, the project is in accord with operating principles agreed upon by western slope water users; third, the project would aid the economy of the entire Arkansas Valley, of which Colorado Springs is a part; and in addition the participation by the city in the project would substantially broaden the base of the project and improve its repayment capabilities by adding our $69 million in assessed valuation to its conservancy district.

The City Council of Colorado Springs has, by ordinance, included the city in the conservancy district of this project. And I would like to submit a certified copy of that ordinance for the record.

And that, Mr. Chairman, concludes my statement.

Mr. ASPINALL. Unless there is objection, the ordinance referred to by Mr. Nichols will be made a part of the hearings following his statement. Hearing none, it is so ordered.

(The material referred to follows:)

AN ORDINANCE CONSENTING TO THE INCLUSION OF THE CITY OF COLORADO SPRINGS IN THE PROPOSED SOUTHEASTERN COLORADO WATER CONSERVANCY DISTRICT AND IN TO TAXATION BY AND IN SUCH DISTRICT

Whereas sponsors of the Fryingpan-Arkansas project propose to organize a water conservancy district as provided by the Water Conservancy Act contained in chapter 266 of the session laws of Colorado of 1937, and amendments thereto; and

Whereas the Fryingpan-Arkansas project would be of great benefit to the city of Colorado Springs in providing a substantial supplementation of its municipal water supply and assuring economic benefits to the city and the citizens thereof; and

Whereas said Water Conservancy Act requires the written consent of the chief executive officer and approval of the legislative body of any city having a population of 25,000 before such municipality can be included in such district; and

Whereas the population of the city of Colorado Springs, according to the last United States census is in excess of 25,000: Now, therefore, be it

Ordained by the City Council of the City of Colorado Springs, That consent be and hereby is given by the city council to the inclusion of said city of Colorado Springs within the boundaries of the proposed Southeastern Colorado Water Conservancy District and to taxation in and by such district pursuant to the statutes in such case made and provided, and that the proper officers of the city be and they hereby authorized and directed to execute such documents as may be required therefor.

This ordnance shall be in full force and effect from and after its passage and publication as provided by the charter.

Introduced, read, passed on first reading, and ordered published this 23d day of February 1955.

C. HARRY BLUNT,
Mayor and President of the Council.

Attest:

R. F. SONNEKSON,
City Clerk.

Finally read, passed, adopted, and approved this 8th day of March 1955.

C. HARRY BLUNT,
Mayor and President of the Council.

Attest:
[SEAL]

R. F. SONNEKSON,
City Clerk.

I hereby certify, that the above and foregoing is a true and correct copy of an ordinance passed at the regular meeting of the City Council of the City of Colorado Springs, Colo., held on March 8, 1955.

In witness whereof, I have hereunto set my hand and affixed the seal of the city, this 11th day of March 1955.

R. F. SONNEKSON,
City Clerk.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. First, I would like to ask Mr. Elliot:

Mr. Elliot, what are the rates for water in the city of Pueblo?

Mr. ELLIOT. They are all on flat rates, except to metered customers, which amounts to about 10 percent. The new rates for a five-room house—I can only quote you approximately—are about $12 a quarter.

Mr. SAYLOR. $12 a quarter. In your metered areas, that is the new rate that went into effect on April 1?

Mr. ELLIOT. That is the new flat rate, sir. The new metered rates, I believe, start at 30 cents for the first 30,000 gallons and then drop 20 on the next 40,000, if I am not mistaken.

Mr. SAYLOR. Can you tell us the rate, the average rate, at which the city of Pueblo is now paying, per acre-foot for water?

Mr. ELLIOT. You mean the purchase of additional water? I don't quite follow your question, sir.

Mr. SAYLOR. What is the cost per acre-foot for water at the present time for the city of Pueblo, from whatever source you get it? You have a number of projects here which you describe as the old water districts, and where they got their water from, and where you have gone out and, since the consolidation, acquired additional rights. Now, somewhere along the line there is a price which the city of Pueblo has figured out they should pay per acre-foot of water.

Mr. ELLIOT. The last acquisition, Mr. Chairman, was the $2,700,000 acquisition from the Otero people.

Mr. ASPINALL. If the gentleman will yield to me, that is not the question that Mr. Saylor is now asking you. He wants to know what the cost of water is to the city of Pueblo per acre-foot currently.

Mr. ELLIOT. It runs between $3 and $5 an acre-foot.

Mr. SAYLOR. Well, now, I am interested, very much so, now, because in this immediate area, at Twin Lakes division, which is a part of this project, the Federal Government in 1955 tried to buy some of that water, and they offered $350 an acre-foot and were told that that was not enough money. And that price was at Twin Lakes. And they would have had to pay to transport it from there.

Mr. ELLIOT. I misunderstood your question, Mr. Saylor.

On the last acquisition, the cost was $250 an acre-foot?

Mr. SAYLOR. No, not acquisition. This is actual purchase of water, not to purchase the right to buy water. This was price per acre-foot. Now, it is one thing if Uncle Sam is going out there to build a project, and then to be told by groups that $350 an acre-foot is not enough for water. And the water was to be delivered down here at Colorado Springs. I think it is very important that this committee know what the attitude of the people in that area is going to be and what price they may have to pay for water.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. In a few minutes I will yield. I think we ought to know what the plans are for the city of Pueblo to fix the price of

water and what plans they have in the future for determining the uses to which this water is to be put. I will be very frank with you that in the East for very many years we have known you cannot have water running indiscriminately in houses. And the cities years back realized that you had to meter and to charge higher and higher rates for water. And nowhere in the East, where water is supposed to be abundant, can you expect to get water at the rate that you are charging in Pueblo.

Now, I commend you, as the engineer, and the people of Pueblo, for having had the foresight to go out and get some additional water. But I think you are being very limited in the amount of money which you are spending, and you are now looking to the Federal Government to do what back East the municipalities have to do.

Mr. CHENOWETH. I do not know just what point the gentleman is trying to make, but I would just like to remind him that every dollar allocated for municipal water will be repaid with interest to the Federal Government. So it is not a handout in any sense of the word. It is merely a loan from the Federal Government, and I think a pretty good investment on the part of the Federal Government.

Mr. SAYLOR. The Federal Government is not in the business of supplying municipal water.

Mr. CHENOWETH. Incidental to other projects, I think it is; other projects where water is involved.

Mr. ASPINALL. I think what the gentleman from Pennsylvania is trying to get from these witnesses is something to assure this committee that whatever the price is, it is a reasonable price, so far as the committee is concerned, to the Federal Government, and there is no question but what the money concerned will be returned. Is that correct, Mr. Saylor?

Mr. SAYLOR. That is correct. In other words, the amount of money to be paid for this water is going to be greater than that in the proposed bill. The best example of that occurred in your own State, the Colorado-Big Thompson. It is one thing to have the Bureau of Reclamation paint a nice picture to you of what they can deliver this for. But when their engineering costs are finally through, only once in 52 years have they ever completed a project at the price at which they have said they can deliver it.

What I am trying to find out is whether or not the price which you say you can pay for water is the amount that you have indicated in this preliminary report, or whether or not you are willing to pay the price, whatever it may be, if they charge you $50 or $100 an acre-foot. Are you willing to pay for it?

Mr. ELLIOT. Of course, representing the water boards, I can't come out and say definitely "yes" or "no," but, however, water is worth what you are going to have to pay for it. If it is going to take that much to get a drink of water, certainly we are going to have to pay it.

Mr. SAYLOR. In other words, the picture which you are faced with in the bill and in the preliminary figures indicates that you are going to get very cheap water. But all you have to do is look at the history of the Bureau of Reclamation and know that you are not going to get cheap water.

So that what I am trying to find out from you, as representing the city of Pueblo, is whether or not the city of Pueblo is willing to pay

the price that the water costs, regardless of what it is, if this project goes through.

Mr. ELLIOT. They are willing to pay the price as set up in this project presently.

Mr. SAYLOR. Well, suppose that the costs of this project increase proportionately, as did the costs of the Colorado-Big Thompson. Is the city of Pueblo then prepared to pay the price at which water is to be delivered to them, which will be 4 or 5 times the present estimated cost?

Mr. ELLIOT. About the only way I could answer that, Mr. Saylor, would be that it would depend on the circumstances. If they are up against it, and no more water is available, I would say "Yes."

Mr. SAYLOR. Well, now, I am very much interested. If there is no more water available, where is water available? Because this committee has been led to believe that this is the sole source that Pueblo can ever turn to, to get water.

Mr. ELLIOT. You are correct.

Mr. SAYLOR. Then why do you qualify your statement that if water is not available from any other source, this must be done.

Mr. ELLIOT. We certainly would pay the price, because this is the last waterhole. I know of no other place that it could be developed.

Mr. SAYLOR. Denver has been trying to attach itself onto some other projects, here. They have found some other sources of water. Do you mean to tell me that nowhere along that divide, the Continental Divide, could you find another source of water?

Mr. ELLIOT. What I mean, Mr. Saylor, is that the only source of water left for Pueblo is western slope water. There is no more left on the eastern slope.

Mr. SAYLOR. Are there any places that you know of on the eastern slope that might be in closer proximity to Pueblo, or where the water would be available from another source?

Mr. ELLIOT. None that I know of, Mr. Saylor.

Mr. SAYLOR. Now, Mr. Nichols, I might ask you the same question in regard to Colorado Springs. You are a growing, thriving community, and the complexion of your community has changed materially in the last number of years. Is that not correct?

Mr. NICHOLS. That is correct.

Mr. SAYLOR. And not too many years ago, you had really a retired resort town. Many, many people came there because of the fine climate that they found and because it was a nice quiet place in which to live. Is that not correct?

Mr. NICHOLS. That is correct.

Mr. SAYLOR. And in recent years there have been many additions of Military Establishments in the area, and industry has moved into the area, and the entire complexion of the community has changed within the last 20 years. Is that right?

Mr. NICHOLS. That is right.

Mr. SAYLOR. Now, what is the price of water presently in Colorado Springs?

Mr. NICHOLS. Our water is all sold through meters. The composite price, that is, the average price that we get for water we sell, is about $55 an acre-foot. I use the acre-foot price, because we are talking about acre-feet. And if I may, I would like to clarify the matter of

the Homestake water. The $350 per acre-foot offer was the offer of the city of Colorado Springs. And that was a capital consideration. The $350 was for an acre-foot a year, forever. I should have said Twin Lakes. Pardon me. That was $350 from now on, not $350 for 1 acre-foot of water for 1 year.

Mr. SAYLOR. I am delighted to have you clear that up, because the impression created here in the committee from a number of sources was that the offer had been to pay $350 per acre-foot of water for 1 year.

Mr. NICHOLS. I know that was the impression. But the offer was that we were buying $350 an acre-foot of water forever. That was the offer.

Mr. SAYLOR. What has the city of Colorado Springs done to provide water under her present needs and expanded uses, looking toward the future?

Mr. NICHOLS. As brought out in my statement, we have spent about $15 million in a transmountain diversion, which, when completed in 1957, will have more than doubled their water supply. That $15 million was raised by conventional financing in our utilities department, not the general city.

Mr. SAYLOR. Now, when that project is completed, how much water will you have available per year?

Mr. NICHOLS. We will have a firm supply of about 32,000 acre-feet, which is enough water to supply our present military commitments, including the full use required by the Air Academy and the full use as indicated by our contracts with other military installations, plus a civilian population of approximately 90,000 people. Our projections of growth on the present rate indicate that we will have reached that point in about 8 to 10 years.

Mr. SAYLOR. Are there any other sources to which Colorado Springs is looking at the present time to supplement their present supply of water, other than this Fryingpan-Arkansas project?

Mr. NICHOLS. We have investigated other projects. One of them was the Twin Lakes project which you mentioned. The other one was a transmountain diversion, a single purpose diversion, similar to the Fryingpan-Arkansas project.

Mr. SAYLOR. From what stream would that be taken?

Mr. NICHOLS. That would be from Homestake Creek, a western slope stream near the Fryingpan, but north of there.

Mr. SAYLOR. Would it be necessary for you to build a reservoir on the west slope?

Mr. NICHOLS. It would be; yes, sir.

Mr. SAYLOR. And what would be the capacity of that reservoir?

Mr. NICHOLS. In general, about equal to the amount of water that we annually wish to divert.

We have not got final engineering on any of those other projects yet, because we were exploring those other projects for some time back. And we arrived at the conclusion, as mentioned in my statement, that the Fryingpan-Arkansas project had the most to offer the city, and the city in turn would do considerable for it in firming up its base for repayment.

Mr. SAYLOR. Now, is the city of Colorado Springs prepared to pay the price that water would cost in this project, not as reflected just by the preliminary figures, but the final cost of the project?

Mr. NICHOLS. Yes, sir. The Bureau of Reclamation figures, which were mentioned in here the other day, indicated that the cost of the water to the city of Colorado Springs, delivered to the city at the city, would be approximately $52 per acre-foot, which is about equal to the selling price now. It will probably in the future raise the rates on water in Colorado Springs.

Mr. SAYLOR. Now that, of course, is for untreated water, too, is it not?

Mr. NICHOLS. That is untreated water; yes.

Mr. SAYLOR. Then you would have the cost of treating the water, plus the cost of your own distribution system?

Mr. NICHOLS. That is right. And I might mention that we are presently paying $40 an acre-foot for some water developed by local wells and sold to us by the owners of the wells.

Mr. SAYLOR. If the cost of the water would increase to $100 an acre-foot, do you think that Colorado Springs would be able to pay that amount for water in the future?

Mr. NICHOLS. I think it would be necessary to; yes, sir.

Mr. SAYLOR. Are your contracts which you have, both with the Federal Government and with your own consumers, subject to regulation by the Public Utilities Commission of Colorado?

Mr. NICHOLS. The city of Colorado Springs is a home-owned city, and our city council is our public utilities commission.

Mr. SAYLOR. Therefore, in other words, you are the sole judge of the rate which you charge?

Mr. NICHOLS. Yes, sir.

Mr. SAYLOR. And it is kept under control by the fact that on the first Tuesday after the first Monday in November of each year, if the city fathers do not perform properly, the local constituency handle it?

Mr. NICHOLS. Yes, sir.

Mr. SAYLOR. That is a good control. I commend you on that. Thank you very much.

Mr. ASPINALL. Does the gentleman from North Carolina have any questions? The gentleman from Colorado?

Mr. CHENOWETH. I want to thank you both for the fine convincing statements you have made.

Mr. ASPINALL. Mr. Utt?

Mr. UTT. How much water is now being diverted on the transmountain diversion by the Columbine ditch and the Ewing ditch, and such other transmountain diversions as you have, in acre-feet per year?

Mr. ELLIOT. About 4,000.

Mr. UTT. And how much in the Fryingpan-Arkansas project?

Mr. ELLIOT. Our anticipated needs for the next 10 years are about an additional 5,000 acre-feet.

Mr. ASPINALL. Thank you very much for your statements and your appearance before the committee.

Mr. ELLIOT. Thank you, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado to introduce the next witness.

Mr. CHENOWETH. Mr. Chairman, I want to introduce a banker from Colorado, who is president of the Colorado Savings & Trust Co. He is a prominent banker, who I think will present testimony as to the need for the water and the ability of the farmers in that area to pay the cost of the water as provided in this project.

Mr. ASPINALL. We are very glad to have you before our committee, Mr. MacDonald. You may proceed, sir.

STATEMENT OF J. H. MacDONALD, LA JUNTA, COLO., PRESIDENT, THE COLORADO SAVINGS & TRUST CO.

Mr. MACDONALD. My name is J. H. MacDonald. My home is in La Junta, Otero County, Colo., where I am president of the Colorado Savings & Trust Co. and the mayor pro-tem of that city.

I am here representing the Arkansas Valley Clearinghouse, an organization of the 25 banks located in the area most affected by the proposed Fryingpan-Arkansas transmountain Division project which is designed to serve the farmers, stockmen, and municipalities located in that area. More than half of the loans carried by these banks are to farmers and stockmen for production purposes. Nearly all the wealth produced in the area comes from agriculture, except in industrial Pueblo and reduced coal mining in Las Animas and Huerfano Counties. All of the banks, which I represent, are largely reliant on the well-being of agriculture for their deposits and investments. In my own bank we have about 400 farmers doing business with us, most of whom are borrowers. We have no so-called wealthy farmers and no gentlemen farmers. Probably a net worth of $250,000 would represent the richest and a net worth of minus zero the poorest. Very few of them are reaching the full potentiality of production of which their farms are capable, because of the shortage of irrigation water especially in the early spring and fall months.

Many of them have not produced a crop for the past 3 years because of the drought conditions existing in the watershed of the Arkansas River that usually supplies sufficient irrigation water during the late spring and early summer months. Many farmers located along the river bottom have resorted to pumping water from shallow underground sources, which has a high mineral salt content and which, if used exclusively, contaminates the soil and will eventually make the land nonproductive. It is expensive and is affecting the water table, which in turn affects the river flow, as more pumps vie for the underground supply of water. This water supply is not available to the great majority of the farms. The valley has never had sufficient irrigation water at the right time to properly mature the diversified crops the soil of the valley is capable of producing.

It is my understanding that none of the water proposed to be obtained through this legislation would be used on lands not now under irrigation. The additional water would make for a far more prosperous farm economy among those good people now engaged in agriculture and would make these farmers better customers for all kinds of farm improvements, machinery, as well as every other kind of commodity. From a fair to middling economy, it would bring this section up to a well-being economy. Without it, there can be no improvement, since there is no other source of water for this very fertile valley.

We can grow almost any crop except those grown in the semi-tropical tier of States located in the southeast, southern and southwest parts of the country.

The bankers of the area feel that with this supplemental supply of water sufficient additional wealth can be produced to more than

pay that part of the cost of the project charged against agriculture and have asked me to present the following resolution, which they adopted unanimously.

Mr. Chairman, I request that the resolution be entered into the record of this hearing.

Specifically it is the considered judgment of the Arkansas Valley Clearinghouse Association that the average cost of $5.40 per acre-foot for water under the proposed project is economically sound and within the ability of the individual farmer to pay. This association believes that where individual farmers invest from $150 to $200 for feed, fertilizer, labor and fuel, that such a small charge is excellent crop insurance.

As a member of the City Council of La Junta and as an officer of the chamber of commerce, I know of the great difficulty we have had in securing even small industries to locate in the valley, because of the lack of good water. Our city supply comes from shallow wells and, I understand, is the second hardest municipal water supply in the United States, the hardest water being located 18 miles east of La Junta at Las Animas. The municipal supply of water in nearly every town in the valley is full of salts and alkali. We could bottle our municipal supply for medicinal purposes and thereby obtain our only local industry. With our climate and other natural facilities and with a supply of decent water for domestic and industrial use, we could no doubt interest small industries in our various communities and thereby again help stabilize our economy. It is my understanding that a part of this water would be sold to the various municipalities as would the electrical energy produced as a byproduct. The City Council of La Junta and the chamber of commerce have asked me to represent them here and to express the hope that this legislation will be approved by you and adopted by the Congress.

Mr. ASPINALL. Thank you very much.

(The resolution referred to follows:)

RESOLUTION OF THE ARKANSAS VALLEY CLEARING HOUSE ASSOCIATION

Whereas the banks comprising the Arkansas Valley Clearing House Association serve the area known as the Arkansas Valley in Colorado, and

Whereas the proposed Fryingpan-Arkansas diversion projectwould be of great economic benefit to the communities served by us and especially to the farmers and stockmen of these communities, and

Whereas under present conditions the irrigation water derived from the Arkansas River is insufficient to properly grow and mature various crops planted, especially is it insufficient to properly mature crops in need of water in late July and August and September, resulting in a great hardship to the farmers, and

Whereas there has been a curtailment of the number and kinds of livestock feed for market by the individual farmers, because of the lack of feed crops occasioned by insufficient irrigation water, thereby further curtailing the agricultural economy, and

Whereas the proposed additional water derived from the diversion project would assure the proper maturing of such crops and prosperity of the farmers of the valley, and

Whereas the economy of the whole Arkansas Valley in Colorado would be greatly improved, making it less necessary for the United States Government to make direct production loans to farmers on irrigated lands and less necessary to pay them crop insurance benefits, and

Whereas in many instances individual farmers invest from $50 to $200 in cash per acre for seed, fertilizers, hand labor and fuel in growing and harvesting

crops and many now use irrigation water derived from wells at excessive cost per acre, and

Whereas this proposed diverted water would supplement the present supplies of irrigation water at a time most needed to mature crops at an estimated cost of $5.40 per acre-foot, and since the estimated cost of this additional water is economically sound and feasible and within the ability of the individual farmer to pay; therefore, be it

Resolved, That it is the stated opinion of this association that the farmers of the Arkansas Valley in Colorado can well afford to pay and can pay the sum of $5.40 per acre-foot of water without hardship to themselves and to the benefit of themselves and their respective communities and that such charge is reasonable; be it further

Resolved, That a copy of this resolution be forwarded to the officers and directors of the Water Development Association of Southeastern Colorado for presentation to the Subcommittees on Irrigation and Reclamation of the Interior and Insular Affairs Committees of the United States Senate and the United States House of Representatives as evidence of full endorsement of the Fryingpan-Arkansas diversion project and the request be made for authorization through S. 300 and H. R. 412.

March 10, 1955.

THE ARKANSAS VALLEY CLEARING HOUSE ASSOCIATION.
HAL LEBRECHT,
President, First National Bank, Trinidad, Colo.

Members: First National Bank, Springfield, Colo.; Colorado State Bank, Walsh, Colo.; First National Bank, Holly, Colo.; American State Bank, Granada, Colo.; Valley State Bank, Lamar, Colo.; First National Bank, Lamar, Colo.; State Bank of Wiley, Wiley, Colo.; McClave State Bank, McClave, Colo.; First National Bank, Eads, Colo.; First National Bank, Ordway, Colo.; Colorado Savings & Trust Co., La Junta, Colo.; La Junta State Bank, La Junta, Colo.; First National Bank, Las Animas, Colo.; Rocky Ford National Bank, Rocky Ford, Colo.; Empire State Bank, Rocky Ford, Colo.; J. M. Beaty & Co., Bankers, Manzanola, Colo.; First National Bank, Fowler, Colo.; Fowler State Bank, Fowler, Colo.; First National Bank, Trinidad, Colo.; Trinidad National Bank, Trinidad, Colo.; First State Bank, Walsenburg, Colo. Associate Members: First National Bank, Pueblo, Colo.; Pueblo Savings & Trust Co., Pueblo, Colo.; Minnequa Bank, Pueblo, Colo.; Arkansas Valley Bank, Pueblo, Colo.

Mr. ASPINALL. If there is no objection, the resolution referred to by the gentleman will be made a part of the record immediately following his statement.

Mr. MacDonald, do you know of any objection whatsoever in the Arkansas Valley to the levying or paying of the amount called for in the formation of the conservation district and the collection of the tax that would be necessary to have some general responsibility for the repayment of the cost of construction and the operation of the Fryingpan-Arkansas project?

Mr. MACDONALD. Of course, any tax is objectionable, but this is the least objectionable. There would be no opposition. It would be paid gladly and willingly. Every taxpayer in the valley would be glad to share.

Mr. SAYLOR. As far as you know, no particular class of taxpayers is raising any objection whatsoever?

Mr. MACDONALD. Not that I know of, no.

Mr. SHUFORD. I would like to ask this witness, who is a banker, what is the average value of the farmland in this district?

Mr. MACDONALD. In that whole district to the State line?

Mr. SHUFORD. Yes; about 300 miles, I guess.

Mr. MACDONALD. It would vary, I would say, from $150 to $100 or something like that, to $1,200 an acre.

Mr. SHUFORD. That is irrigated land?

Mr. MACDONALD. Yes, sir.

Mr. SHUFORD. What is the value of the land that is not irrigated?

Mr. MACDONALD. $12.50 to $15 an acre.

Mr. SHUFORD. Have you had a chance to make a calculation as to what this project will average per acre?

Mr. MACDONALD. Just roughly, generally, yes.

Mr. SHUFORD. What figure do you have on that?

Mr. MACDONALD. You mean the cost of the total project?

Mr. SHUFORD. That is right.

Mr. MACDONALD. As I remember, it is about $400.

Mr. SHUFORD. $400 an acre?

Mr. MACDONALD. Something like that.

Mr. SHUFORD. And then that would bring your land up from——

Mr. MACDONALD. I am not sure.

Mr. SHUFORD. So you really have not made any calculation. I think that is all.

Mr. CHENOWETH. Will the gentleman yield? You wanted to know the cost per acre?

Mr. SHUFORD. Yes; what would be the cost per acre?

Mr. CHENOWETH. The allocation to irrigation is $67 million, and there are 322,000 acres that would receive supplemental water. That would run something like $200 an acre; would it not? Something like that.

Mr. SHUFORD. Thank you.

Mr. ASPINALL. If my colleague will yield, you could get a better picture by figuring the amount of water that is allocated to each acre and then getting the cost per acre-foot that is necessary to take care of the cost. Because when you figure it spreading over 322,000 acres, you must not leave in the mind of anyone that that is all the water necessary to take care of the 322,000 acres.

Mr. MILLER. In the lands not being irrigated, is there an increasing threat of drought through that area?

Mr. MACDONALD. Yes, every day makes conditions worse, of course; every day without rain.

Mr. MILLER. The reason I ask is that during the last 30 minutes I had a call from 2 people in Nebraska who told me that 8 counties should be put in the disaster-relief area. There is a small area irrigated at the center of this, and they want more water now to put on the land. The drought area is spreading, and the ravages of drought can be terrific.

Mr. SHUFORD. Would the gentleman yield at that point? I would like to comment that in my State and district, in the East, there are three counties in the distressed area now, some of the other counties in the district should also be included within the distress area because of drought.

Mr. MILLER. And of course the gentleman can understand how people living in drought areas need water for crops. Nebraska has a tremendous amount of underground water. They have running streams in considerable amounts. It has not always been easy to get the projects approved and get water on this land that is so dry. And it comes to my attention because these 8 counties have never been in the drought area before, and they are part of the good land in the State that has in the past produced tremendous crops. The supple-

mental water here for these 322,000 acres in this project would be some assurance that you could grow additional crops if the water were available.

Mr. MACDONALD. It would supply water at the time it is most needed, and that would be the early spring and early fall months of the year, as I understand it.

Mr. MILLER. What is the amount of water for municipal purposes? You have not testified to that?

Mr. MACDONALD. I have not.

Mr. ASPINALL. We do not want to get the wrong picture about the effect that this project would have on the drought situation in southeastern Colorado. This project is not going to do away with any of the drought situation or any dust storms in the Arkansas Valley; is it?

Mr. MACDONALD. That is right, sir.

Mr. ASPINALL. It has an opportunity of firming up the aggregate on particular lands, 322,000 acres, which is a very small part of the area. Isn't that right?

Mr. MACDONALD. That is right.

Mr. ASPINALL. But as far as trying to paint a picture of the drought situation being cured by the Fryingpan-Arkansas project, we do not want to leave that impression.

Mr. MACDONALD. Oh, no.

Mr. MILLER. If you had no irrigation there, though, there would be blowing sand.

Mr. MACDONALD. That is right. And in fact, part of that area is blowing now.

Mr. MILLER. It makes quite a contrast when you see crops drying up around a green oasis.

Mr. CHENOWETH. If my colleague will yield, I might state that 2 weeks ago we visited this project. And if we had this project under consideration, it would look a great deal different.

Mr. ASPINALL. Will my colleague be fair? What will 0.6 of an acre-foot of water to be delivered in the fall do for the drought situation in the Arkansas Valley as of this particular moment?

The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. Now, Mr. MacDonald, you say that you have approximately 400 farmers doing business with your bank.

Mr. MACDONALD. Yes, sir.

Mr. SAYLOR. How many of those 400 farmers live on these 322,000 acres to be benefited by this project?

Mr. MACDONALD. Now, that would be an estimate. I would say approximately two-thirds of them.

Mr. SAYLOR. 250 out of the 400?

Mr. MACDONALD. That is about right.

Mr. SAYLOR. Now, those farms vary in size, as the men here testified this morning.

Mr. MACDONALD. Yes, sir.

Mr. SAYLOR. I think 1 gentleman said he was farming 60 acres. The other man said he had 2,200. The other one said he had 600 or 900 acres.

Mr. MACDONALD. Yes, sir.

Mr. SAYLOR. That same pattern follows in the area where you are farming; is that right?

Mr. MACDONALD. The average would be smaller, around the La Junta-Rocky Ford area. There are very few 2,000-acre farmers, and there are relatively few 900-acre farmers. They run from 80 to 120, to 160 acres.

Mr. SAYLOR. Now, you say that the value of the farms, these 250 farms in your area, which I assume are typical of the farms in the entire valley, vary anywhere from $200 an acre, to $1,200 an acre.

Mr. MACDONALD. Yes, sir.

Mr. SAYLOR. Now, that is a tremendous spread in value. So I am going to have to pursue it a little further.

What portion of the land is worth $1,200 an acre?

Mr. MACDONALD. Oh, a relatively small amount. The land that would be under a ditch known as the Rocky Ford ditch. Offhand, I cannot tell you how many acres, but relatively few. 6 to 8 thousand, would be my estimate.

Mr. SAYLOR. Well, then, of this 322,000 acres, what would you say the average cost of the farms would be, per acre?

Mr. MACDONALD. I would say $250 to $300 per acre.

Mr. SAYLOR. $250 to $300. Now, as a banker making loans to the farmers in that area, your cashier and loan committee go out and inspect the farms; is that right?

Mr. MACDONALD. That is right.

Mr. SAYLOR. And they come back and they report to you that they have found that your applicant has been a fairly industrious farmer, his buildings are in good repair, his fields are clean—I am hoping that that is what they report to you—and they think it is a very good loan. Now, how much will your bank, considering also that the individual is a good moral risk, loan on the average farm worth $200 an acre?

Mr. MACDONALD. We would be limited by statute to two-thirds of the value, or in some cases 50 percent of the value, depending upon the type of loan, whether it was a term or was amortized.

Mr. SAYLOR. Of course, suppose it is a GI that has gone down there, and Uncle Sam tells you he is going to guarantee a good portion of the loan. Suppose it is an FHA loan, and they get Uncle Sam to guarantee it, so that there is a limitation on how much you would loan on such a farm.

Mr. MACDONALD. That, of course, is limited by whatever the Government guarantee is.

Mr. SAYLOR. Do you make 100-percent GI loans?

Mr. MACDONALD. We don't have a single farm GI loan, sir; no, sir. We don't happen to have any.

Mr. SAYLOR. The reason I am askng that is that you as a banker are coming here and telling this committee that you think this is a good proposition. I am trying to look at it now as a banker, and I am wondering whether as a banker I would consider loaning the full value.

Mr. SHUFORD. Will the gentleman yield? I would like to state to the gentleman that there has been a difference between the farm loans under the GI loan bill and the city loans, and for that reason there was a discrepancy, in my opinion, in favor of the city rather than the farm, which has been corrected in this Congress. That probably is one reason why there are no farm loans.

Mr. SAYLOR. In other words, I am looking at this now reminding you that I want you to look at this as a banker.

Mr. MACDONALD. The land is worth nothing without water. It is worth $12.50 an acre without water.

Mr. HALEY. After all, the gentleman must take into consideration that when the banker is loaning his money, that is a little bit difficult as compared to loaning somebody else's.

Mr. SAYLOR. I am trying to find out whether that is the viewpoint of this group of bankers he is here representing. He is coming here representing the Arkansas Valley Clearing House, which represents all the banks in the area. I want to find out whether or not this is just some more chamber of commerce publicity, or whether or not he is really sincere in believing that we should apply the same principle in loaning money, as Congressmen, to this area, that he would as a banker, and whether or not he is coming here recommending that we make a loan that he, as a banker, would not make.

Mr. HALEY. I might say that looking at the gentleman, he looks kind of like my banker, and I do not think that he would make many loans that he did not have pretty good collateral on.

Mr. MACDONALD. Thank you, sir.

Mr. SAYLOR. I wanted to ask him as my next question, how his foreclosure rate is out there.

Mr. MACDONALD. Our bank has not foreclosed on a loan in the last 30 years.

Mr. SAYLOR. Then I confirm your opinion, Mr. Haley.

Mr. MACDONALD. I mean a farm loan. We have had some automobile repossessions.

Mr. SAYLOR. There have not been any loans made that have been 100 percent of value then.

Now, I am interested that your organization, you say, can pay $5.40. I think that is the amount that you said, per acre-foot.

Mr. MACDONALD. That is right.

Mr. SAYLOR. You say that is good insurance. If the same pattern occurs in the Fryingpan-Arkansas project that has occurred in other projects which the Bureau of Reclamation has put out, and the costs, instead of being $5.40 per acre-foot, can be $23 or $24 an acre-foot, which is not to be unexpected, in view of the discrepancy between the original estimated cost of projects by the Bureau of Reclamation and the final cost, then what about your farmers? Can they pay that?

Mr. MACDONALD. I certainly would be willing to loan a farmer money, $23 or $24 an acre-foot, to get water to complete a crop, to mature a crop, that would increase his tonnage, or his yield tenfold. Certainly. It would be good. Yes, sir.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado.

Mr. CHENOWETH. A very fine statement, Mr. MacDonald, and I hope you have convinced Mr. Saylor that if you are willing to loan the money, the United States Government ought to be willing to put a little money in there also.

Mr. SAYLOR. I do not want Mr. MacDonald to walk out here questioning the fact that he is a good banker. I have found out how good a banker he is.

Mr. MACDONALD. I wish you would convince the board of directors of that.

Mr. ASPINALL. That is all, Mr. MacDonald. Thank you very much.

The Chair wishes to make a statement at this time in answer to the statement of the gentleman from Pennsylvania. The gentleman has brought before this committee consistently—and I think he has performed a very valuable service—that in many of these reclamation projects, most of them in fact, the so-called reclamation projects have cost many times their original estimated cost.

Now, the facts of the case are that since the La Follette-Monroney Reorganization Act of Congress in 1946 and 1947 and the authorization of reclamation projects by the committees having jurisdiction in the Congress, that is, the Committee on Interior and Insular Affairs in each House, the gentleman's criticism does not apply, because projects authorized since that time have not, except for a very few, cost more than their estimated cost. The projects that have cost so much—and sometimes I would say to the gentleman from Pennsylvania that the increased cost is astounding, 11 times what the original estimate was supposed to be—have been authorized by riders in appropriation bills, by riders on flood-control acts, and by secretarial authorization by the Secretary of the Department of the Interior. But what this committee and its counterpart in the Senate have been trying to do since 1946 and 1947 has been to hold the Bureau of Reclamation and the Department of Interior to its estimates and to see that those estimates are sound as we study them.

Is that correct?

Mr. SAYLOR. That is correct. But I would like, if the gentleman will yield, to observe that the change of parties makes no difference. And I would like to recall a very sad experience which we had on this committee, in which we endeavored to make sure that there was enough money appropriated, and that that was the project which started out with an estimate of around $10 million and when it ended up we had $34 million in it, and then we came up with the startling discovery that the Bureau did not even own the water that was going to run through the project, and we had to go out and buy that in addition.

Mr. ASPINALL. Of course, my colleague will admit the fact that it was not a reclamation project. It was a public power project, in a territory over which this committee has jurisdiction.

Mr. SAYLOR. That is correct.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado for further introductions.

Mr. CHENOWETH. Mr. Chairman, we now go to the power features of this project. We have two groups who are going to appear.

First, I want to introduce the group representing the private utilities, Mr. L. R. Patterson, assistant vice president for electric operations, Public Service Co. of Colorado, and Mr. W. C. Porter, who is vice president (operations) of the Southern Colorado Power Co.

Mr. ASPINALL. It is the Chair's wish that both private and public power representatives have an opportunity to present their statements before questioning.

You may proceed, Mr. Patterson. We are glad to have you before our committee.

STATEMENT OF L. R. PATTERSON, ASSISTANT VICE PRESIDENT, ELECTRIC OPERATIONS, PUBLIC SERVICE CO. OF COLORADO, DENVER, COLO., ACCOMPANIED BY W. C. PORTER, JR., VICE PRESIDENT (OPERATIONS), SOUTHERN COLORADO POWER CO.

Mr. PATTERSON. Thank you. My name is L. R. Patterson, and I am assistant vice president for electric operations, Public Service Co. of Colorado. With me is my associate in this statement, Mr. W. C. Porter, Jr., vice president of the Southern Colorado Power Co.

The following is a joint statement of Public Service Co. of Colorado, Denver, Colo., and Southern Colorado Power Co., Pueblo, Colo., sometimes herein referred to as the companies, in connection with the proposed Fryingpan-Arkansas project.

In the area adjacent to the proposed project, Public Service Co. of Colorado furnishes electric service in the upper Arkansas Valley in Leadville and Salida, Colo., and contiguous areas. Southern Colorado Power Co. supplies electric service in the portion of the Arkansas Valley in Colorado extending from Canon City to the vicinity of La Junta, Colo.

These companies, therefore, are directly interested in the proposed Fryingpan-Arkansas project and the development of hydroelectric power in connection therewith.

The State of Colorado has an area of 103,967 square miles, approximately three-fifths being mountainous. In 1950 its population was 1,325,089, an average of approximately 13 people per square mile. Its area approximates that of the combined States of New York, Pennsylvania, New Jersey, and Delaware with a population in excess of 30 million or about 23 times the population density of Colorado. By reason of its mountainous terrain and limited rainfall, its population is concentrated in cities, towns, and irrigated areas.

The State has an abundance of rich soil and is handicapped only by the limitations of its water supply. The limited amount of precipitation during the growing seasons must be supplemented by irrigation. Basically, this region has an agrarian economy and its productivity, development, and availability to contribute to the national welfare in this respect is limited to the extent that additional water can be made available.

Our companies believe it is only sound econmics to develop incidential byproduct hydroelectric power in connection with reclamation projects when power generation is economically feasible. Such hydroelectric generation should always be subordinate to the primary purpose of supplying needed irrigation and domestic water. We do believe, however, that it is highly inappropriate for the Government to construct transmission lines where such facilities can be provided by private capital and where existing facilities can be used.

COMPANIES HAVE A PROPOSAL

In making this appearance and presenting this statement before the committee, it is the purpose of the companies to offer a constructive proposal which will—

1. Reduce the cost of the project by utilizing existing transmission lines and by the companies constructing any necessary additional transmission facilities.

2. Improve the economics of the project by providing more net revenue.

3. Provide a plan for the equitable sale and disposition of the propect power within the general project area.

We intend to show that our proposal will assure the most dependable and efficient operation of the power generating facilities of the project and will assure substantial benefits to all concerned. Before explaining the companies' proposal and showing how these benefits will be obtained, a brief description giving the location of the hydroelectric stations of the project with relation to the companies' systems and a statement of the expansion programs of the companies is presented.

The proposed plan for the Fryingpan-Arkansas project includes the construction of 6 hydroelectric generating stations in the upper valley of the Arkansas River between Leadville and Salida, Colo., and 1 hydroelectric generating station on the Arkansas River adjacent to the city of Pueblo.

The Public Service Company of Colorado presently has a 115 kilovolt transmission line which parallels the Arkansas River between Leadville and Salida, Colo. The six hydroelectric generating stations of the project mentioned above are immediately adjacent to this line. This line, in addition to interconnecting the Leadville service area of the company with the Salida service area, is an integral part of the backbone transmission system of the company. The company and its predecessors have rendered electric service in these areas for more than 46 years meeting all service requirements. The powerplant proposed to be constructed near Pueblo is in the heart of the service area of the Southern Colorado Power Co. where this company has served for more than 43 years.

PUBLIC SERVICE COMPANY OF COLORADO

The central system of the Public Service Company of Colorado extends from the Greeley area in north-central Colorado southward to the Denver metropolitan area and thence westward to the Leadville area. From Leadville the system has 2 branches, 1 extending westward to the Grand Junction area and 1 extending southward past the city of Salida into the San Luis Valley almost to the New Mexico State line.

As of December 31, 1954, the electric power requirements of the central system were supplied from 6 steam electric generating stations with a total capability of 427,000 kilowatts and 8 hydroelectric generating stations with a combined capability of 38,050 kilowatts making a total system capability of 465,050 kilowatts. These 14 generating stations are interconnected with each other and with the principal load centers of the company by approximately 950 miles of high voltage transmission lines. From this extensive system the company was serving at the end of 1954, 257,566 electric customers. In addition the company was supplying electric energy at wholesale to 3 private electric utility companies and 3 municipal systems which in turn supplied service to approximately 43,000 more electric customers.

The Public Service Company of Colorado has a wheeling contract with the Federal Government in connection with the Colorado-Big Thompson project under the terms of which the company's trans-

mission system is being used to supply electric energy from that project to five REA systems at 18 points of delivery, to the Bureau of Reclamation and to 1 municipal system. Four of these five REA systems have points of delivery relatively adjacent to the Fryingpan-Arkansas project.

Since the end of World War II, the company has made expenditures of approximately $102 million to expand the facilities of its electric system. This has included major additions to 3 of its existing generating stations and 1 new steam electric generating station. The addition of these facilities has more than doubled the generating capability of the company during the past 9 years. During the same time, the company has built 260 miles of high-voltage transmission lines.

At the present time, the company has 2 steam electric generating projects going forward, 1 being scheduled for completion during this year which will add 100,000 kilowatts of generating capacity on its central system, at 238-percent increase since the end of the war. Several transmission-line projects are also under construction and planned to keep pace with generating capability.

SOUTHERN COLORADO POWER CO.

The Southern Colorado Power Co. supplies retail electric service in Teller, Fremont, Custer, Pueblo, Crowley, and Otero Counties of Colorado. The communities served are in or adjacent to the Arkansas River Valley and in general the system extends from Canon City on the west to La Junta on the east. A branch of the system supplies service to the Victor-Cripple Creek district in Teller County. As of December 31, 1954, the power requirements of the system were supplied from 3 steam electric generating stations and 1 small hydroelectric plant.

The total capability of all generating stations was 60,000 kilowatts. These stations are interconnected by a system of transmission lines which in turn supply service to the system load centers and the transmission network consists of approximately 410 miles of 115-kilovolt, 69-kilovolt, and 24-kilovolt circuits.

At the end of 1954, the company was supplying retail electric service to 43,514 customers in the area. Service also was supplied on a partial basis to the city of Las Animas. A 115-kilovolt transmission line between Pueblo, on the company's system, and the municipality of Colorado Springs permits the interchange of energy between the company's system and the municipally owned distribution system of Colorado Springs and also provides reserve capacity for both.

Southern Colorado Power Co. also supplies wholesale electric service to 3 Rural Electric Cooperative systems at 6 different points of delivery. These systems in turn, of course, furnish retail service to several thousand rural customers in the area.

For the past 10 years the company has made expenditures totaling approximately $15 million for the purpose of expanding its facilities. Included in this program was a new steam-generating unit installed in the Pueblo plant in 1949 and an entirely new steam-electric station at Rocky Ford put in service in early 1951. These units have provided full capacity for the load requirements of the area and additions to substations, distribution systems, and other facilities have

enabled the company to provide excellent service at all times with completely adequate reserve capacity.

The company completed, in late 1954, a 115-kilovolt transmission line between Pueblo and Canon City which will supplement an existing 69-kilovolt line between these two load centers. An additional 115-kilovolt transmission circuit between Pueblo and La Junta is planned for 1955. Construction is in progress, to be completed in the fall of 1955, on the installation of a new 16,500-kilowatt generating unit at the Canon City plant. When this unit is in service, generating capability of the system will have been increased 138.5 percent since 1943.

PROPOSAL OF PUBLIC SERVICE COMPANY OF COLORADO AND SOUTHERN COLORADO POWER CO.

(*a*) The companies propose to make available their existing transmission facilities and to construct, operate, and maintain at their own expense all additional transmission facilities necessary to market within and adjacent to the project area, the electric power and energy produced by the Fryingpan-Arkansas project.

(*b*) All power and energy from the project to be sold at the 115-kilovolt plant bus bar at the time the power becomes available with preference given to those customers entitled thereto, such customers to contract either directly with the Federal Government or the companies in accordance with the policy of the Department of the Interior as ultimately determined, the total of firm power contracts not to exceed the capability of the project, as interconnected with the other Bureau projects in the area and as mutually agreed upon by the Department of the Interior and the companies.

(*c*) The companies agree to purchase under long-term contracts all firm power and energy in excess of that contracted for by the preference customers and not otherwise sold or utilized. In addition, the companies agree to contract for such secondary and dump energy and excess generating capacity as the project may have available and not otherwise sold or utilized. Under such plan the project will be assured of the maximum continuous revenue from the time of its completion.

(*d*) The companies agree to accept delivery of power and energy from the project into their transmission systems and to make delivery of an equivalent amount of electric power and energy, adjusted for losses, to the preference customers at delivery points on the companies' transmission systems at voltages of 69 kilovolts and higher or as mutually agreed upon by the companies and the preference customers. For this service the companies to receive compensation to cover the cost of delivery subject to the approval of the Public Utilities Commission of Colorado.

(*e*) The companies agree to the extent that they have capacity available above their own requirements to supply power and energy as standby to the preference customers in the event of inability of the project to meet the customers' contract requirements due to outages or reduction in generation caused by failure of project mechanical and/or electrical facilities.

(*f*) In the event the preference customers in subsequent years require firm power and energy in excess of that supplied from the project or if standby other than that provided in paragraph (*e*)

above is required or desired, the companies agree to supply these requirements from their own generating facilities at wholesale rates approved by the Public Utilities Commission of Colorado.

CONTEMPLATED CONSTRUCTION PROGRAM TO FACILITATE MARKETING OF ELECTRIC POWER FROM FRYINGPAN-ARKANSAS PROJECT

The companies propose to completely integrate the operation of their existing generating facilities with those of the project so as to obtain the most dependable and economical operation of the combined systems. The companies will make available their existing transmission facilities to deliver project power to existing preference customers within and adjacent to the project area. Furthermore, they will construct or cause to be constructed additional transmission facilities when and as required for marketing electric power and energy from the Fryingpan-Arkansas project. A preliminary analysis indicates that the following transmission facilities may be required prior to or at the time of completion of the project:

1. A second 115-kilovolt transmission circuit from Leadville to Poncha Junction.
2. Two 115-kilovolt transmission circuits from Poncha Junction to Canon City.
3. A second 115-kilovolt transmission circuit between Canon City and Pueblo.
4. Necessary switching facilities and transformers to interconnect the new facilities with the existing transmission facilities of the two companies.

BENEFITS OF COMPANIES' PROPOSAL

The proposal by the Public Service Co. of Colorado and by the Southern Colorado Power Co. to provide all additional transmission facilities necessary for the marketing of the electric power developed in connection with the Fryingpan-Arkansas project offers substantial benefits to the following groups:

(*a*) The Federal Government and the Federal taxpayers.
(*b*) The State and local governments and their taxpayers.
(*c*) The Arkansas Valley water users.
(*d*) All project power users including customers of the companies.

BENEFITS TO FEDERAL GOVERNMENT AND FEDERAL TAXPAYERS

The Federal Government and its taxpayers will receive a twofold benefit from the companies' proposal. First, there will be a reduction of approximately $4,750,000 in the construction cost of the project. Second, there will be estimated annual savings to the project of about $314,000 which will be available for repayment of the project.

The reduction in construction cost of the project results from the elimination of the following items of construction from the project plan as set forth in project planning report number 7–8A.49–1, revised: Total tranmsissions eliminated, 355 miles, estimated construction cost, $3,874,000; total substations eleminated, 50,000 kilovolt-amperes, estimated construction cost, $876,000; total reduction in project construction cost, $4,750,000.

This is a direct savings to the taxpayers.

The reduction in annual costs will be made up of the following items based on estimates by the companies' engineers:

Interest at 3 percent on $4,750,000, $142,500; amortization—50 year, 3 percent—0.89 percent, $42,275; operation and maintenance, 355 miles line at $150, $53,250; operation and maintenance, $50,000 kilovolt-ampere substation, at $0.45, $22,500; interim replacements, transmission, 1.03 percent, $39,902; interim replacements, substation, 1.53 percent, $13,403. Total annual cost saved, $313,830.

This savings is available to help repay project costs.

From the tabulation of transmission lines to be deleted from the project by the companies' proposal and by reference to the map included in this statement, it will be found that adoption of the companies' proposal eliminates approximately 220 miles of line which would be a duplication of existing lines and some 60 miles which would duplicate a proposed line of the companies between Poncha Junction and Canon City which is presently under consideration for interconnection purposes whether this project is built or not.

By making use of the companies' existing and planned transmission facilities in the project area, duplication of transmission facilities can be avoided, and there will be substantial savings for the Government and taxpayers in the overall cost of the project.

BENEFIT TO STATE AND LOCAL TAXPAYERS

Should the transmission facilities for marketing the project power be constructed by the Federal Government, they will not be subject to taxation by State and local taxing units. On the other hand, if the proposal of the companies is followed, some $5 million of property will be placed on the tax rolls to help support schools, local and State governments. This is one of the real advantages of participation in the project by local capital.

BENEFITS TO ARKANSAS VALLEY WATER USERS

The real interest of the Arkansas Valley water users, whether domestic or agricultural, is to obtain additional water supply at a cost which they can afford to pay. Any plan, therefore, which aids the financial feasibility of the Fryingpan-Arkansas project without increasing the cost of water is a benefit to the water users.

The plan proposed by the companies improves the financial feasibility of the project by reducing the project cost by approximately $4,750,000 and reducing annual costs by some $314,000.

BENEFITS TO PROJECT POWER USERS INCLUDING CUSTOMERS OF THE COMPANIES

The marketing plan proposed by the Public Service Co. of Colorado and the Southern Colorado Power Co. has distinct advantages to the power users who may be supplied from the Fryingpan-Arkansas project. These may be briefly summarized as follows:

1. The plan proposed by the companies takes cognizance of the preference right of existing REA, municipal and governmental agencies at the time the project power becomes available to the extent that such customers contract for the power.

2. Through the use of the existing and proposed facilities of the companies, widespread disposition of the project power can be accomplished immediately and without any duplication of facilities.

3. Reliability of service will be substantially enhanced under the companies' proposal for three reasons:

First, the backbone transmission system throughout the Arkansas Valley area under the companies' plan will be double circuit whereas under the project transmission plan, this would be single circuit.

This is a very important consideration since an outage of the single-circuit line between Salida and Canon City would completely interrupt flow of project power to the lower valley.

Second, the two companies have a very large operating and maintenance organization with long years of experience which will insure high quality of service.

Third, the integration of the hydroelectric-generating facilities of the project with the steam-generating facilities of the two companies will provide the most dependable service which can be obtained.

4. Integration of the facilities of the two companies with each other as well as with those of the project offers advantages by the pooling of reserve, thereby reducing total reserve capacity required, and by postponement of addition of some steam-generating capacity. These advantages benefit all power customers.

COMPANIES' REQUEST TO THE COMMITTEE

We respectfully request that the committee accept the companies' proposal to make available their transmission facilities and to construct additional transmission facilities as required and that the committee recommend that no authorization be given for construction of transmission lines by the Bureau of Reclamation in connection with the project provided that suitable wheeling or similar contractual arrangements can be negotiated with the companies for the disposition of the project power.

Two years ago, I had the privilege of being before this committee in behalf of the Fryingpan-Arkansas project. And, Mr. Chairman, I would like to request that my testimony of that time be made a part of the record by reference.

Our companies have been supplying electric power in the various sections of the Arkansas Valley for almost a half a century, and therefore we have a great interest in the economic welfare of this area. We know of the need that there is for increasing and developing the water supply in the area.

We feel that we are in a position to make a very substantial contribution toward the financial success of the Fryingpan-Arkansas project, through the integration of our steam-generating facilities, with the hydroelectric-generating facilities of the project, also through the purchase of electric power from the project and the use of our systems to make delivery of project power for the Government under wheeling contracts.

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It is in a spirit of cooperation and helpfulness, therefore, that we have submitted our offer in this statement to help the project. We are fully meeting the electric-power requirements of our consumers.

In 1954, we had the largest margin of reserve capacity in our entire history. In August of this year, we will place in operation a new steam-generating unit with a capacity of 100,000 kilowatts. Construction is now starting on still another 100,000-kilowatt unit, which we will place in operation in the fall of 1957.

We can go on and meet the electric power requirements of our service area in this manner. However, in order to aid in the development of the water resources of the State, we are perfectly willing to postpone the installation of additional steam-generating units until such time as whatever hydropower available from the Fryingpan-Arkansas project is used up.

In this way we feel that our offer to provide an immediate market for all available project power and the use of our facilities set forth in our prepared statement makes a very substantial contribution to the feasibility of the project and is in the best interest of all the people of the State, and therefore merits your very careful consideration.

Mr. ASPINALL. Do you have an additional statement, Mr. Porter?

Mr. PORTER. Congressman Aspinall, my name is W. C. Porter, vice president of Southern Colorado Power Co. of Pueblo, Colo. I did have a few remarks that I was going to make, but in the interest of more important witnesses to follow later on, I think that I simply will say that I concur in the remarks made by Mr. Patterson at this time.

Mr. ASPINALL. Thank you. Unless there is objection, the statement of Mr. Patterson of 2 years ago will be incorporated by reference. Hearing no objection, it is so ordered.

Mr. CHENOWETH. We now have four witnesses representing the REA group, Mr. Charles Fain, assistant general manager, National Rural Electric Cooperative Association, Mr. H. Vance Austin, of Denver, manager of the Colorado State Association of REA cooperatives, Mr. James E. Kane, who is manager of the Sangre de Cristo Electric Association of Salida, and Mr. Robert L. Moore, director, San Isabel Electric Cooperative Association. All of these witnesses will speak from the standpoint of the REA need for additional power in this area.

Mr. ASPINALL. We have 5 at the table, and you only presented 4, Mr. Chenoweth.

Mr. CHENOWETH. There is a member of the staff of the National Rural Electric Cooperative Association present.

Mr. ROBERTSON. I am Charles Robertson, engineer for NRECA, Washington, D. C.

Mr. ASPINALL. You may proceed, gentlemen, as you have lined up your testimony.

STATEMENTS OF JAMES E. KANE, SALIDA, COLO., MANAGER, SANGRE DE CRISTO ELECTRIC ASSOCIATION, INC.; H. VANCE AUSTIN, MANAGER, COLORADO STATE ASSOCIATION OF REA COOPERATIVES; CHARLES J. FAIN, ASSISTANT GENERAL MANAGER, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION; ROBERT L. MOORE, DIRECTOR, SAN ISABEL ELECTRIC COOPERATIVE ASSOCIATION; AND CHARLES ROBERTSON, ENGINEER, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Mr. KANE. Mr. Chairman, as one of your constituents, I will take the floor first. I think that is my privilege.

My name is James E. Kane and my home is in Salida, Colo. I am now, and have been for the past 5½ years, manager of the Sangre de Cristo Electric Association, Inc., the REA-financed cooperative serving the rural area of the upper Arkansas Valley with electric power.

I am here as a member of the delegation appearing before you in support of the Fryingpan-Arkansas project, being a member of the executive committee of the Water Development Association of Southeastern Colorado and representing the three REA cooperatives of the Arkansas Valley on that committee.

For purposes of identification, these are, the Southeast Colorado Power Association of La Junta, San Isabel Electric Association of Pueblo, and Sangre de Cristo Electric Association of Salida. These cooperatives collectively serve the power needs of 35,000 rural people living in 17 counties in southeastern Colorado, comprising approximately one-fourth of the State's total area, and their lines extend from the Continental Divide eastward to the Kansas line. As of December 31, 1954, the total investment in distribution facilities was in excess of $10 million.

Just 2 years ago, 1952, our total purchase and distribution was 23 million kilowatt-hours. In 1954 we purchased and distributed 31,068,248 kilowatt-hours to our consumers.

A comparison of these figures shows that our loads have increased 35 percent in the past 2 years. They are called to your attention because they clearly demonstrate a rapidly expanding use of electricity by the rural consumers in our service area.

It must be borne in mind that a great number of our consumers have had central-station electric service only a relatively short period of time, many of them only for the past 2 or 3 years, and, based upon this previous experience, we definitely are faced with the serious problem of meeting the ever-increasing demand for electric power by the rural people we serve.

Recent load studies indicate very clearly an ultimate demand of 19,000 killowatts and 60,000,000 killowatt-hours of firm power for the 3 systems. The Fryingpan project need have no concern as to a market for the power it will develop. The market is already there and will continue to expand as the rural people put more and more electricity to use in their homes, their businesses, and on their farms.

I should like to point out that we are distribution cooperatives, purchasing our power from other sources. The major supplier of these cooperatives is Southern Colorado Power Co. of Pueblo, Colo.

This company is also experiencing a rapid growth in load and their generating capabilities will soon prove inadequate. Due to the immediate need for an additional source of power, and in an effort to reduce the present cost of power, the three cooperatives are forming the Arkansas Valley Generation & Transmission, Inc., and through contractual arrangements with Southern Colorado Power Co., expect to meet temporarily this power supply problem; however, this is an interim arrangement and in no way forestalls the need of the Fryingpan project with its hydroelectric potential. The Fryingpan project must be authorized and construction gotten under way immediately to meet the constantly increasing demands in the Arkansas Valley.

The Fryingpan-Arkansas project bill which is presently before the 84th Congress carries the full endorsement of not only the three REA cooperatives for whom I speak, but also that of the Colorado State Association of REA Cooperatives and the National Rural Electric Cooperative Association.

In conclusion, I should like to make this observation: In addition to the great need for additional power for the area, the Fryingpan project will also insure the continued production of the presently irrigated area, relieve a distressed domestic water supply situation, and greatly improve the standard of living and the economy of the entire Arkansas Valley.

Mr. ASPINALL. Thank you very much, Mr. Kane.

Mr. Kane happens to be a resident of the Fourth Congressional District.

Mr. HALEY. Mr. Chairman?

I might say to you, Mr. Kane, that you have very fine representation. I hope that you continue sending him back up here. He is doing a marvelous job.

Mr. ASPINALL. The next gentleman?

Mr. AUSTIN. My name is Vance Austin. I am manager of the Colorado State Association of REA Cooperatives. I have a statement and some exhibits here. I will merely ask that they be put in the record and will say that we of the Rural Electric Association of Colorado, representing the rural electric users there, very, very much feel that we need this project. We speak particularly from a power angle and the need for the power. Our association has gone on record a number of times. The exhibits here, too, indicate resolutions of our association in favor of this project.

One other exhibit that I have in there, the one in green ink, that is not even marked as an exhibit, I placed in at the last minute, because it gives a little bit of the amount that we have paid on the Colorado-Big Thompson for power, indicating there clearly that we would make a great deal of the payment toward this project if it were built; that we badly need the power.

The some 65,000 rural consumers in Colorado who have sent me here to testify before you, through their Colorado State Association of REA Cooperatives wish me to express for them their appreciation of your consideration of their electric and water needs. It might be important enough to mention, that at a membership meeting of that association, I was instructed to appear before you with our resolution and statement of our need.

Attached hereto as exhibit A is a copy of the resolution of our State Association Board of July 1, 1953. It still stands as the thinking of our association, as per the reaffirmation expressed in the resolution

also attached hereto as exhibit B, passed very recently at the membership meeting of our association, March 15, 1955.

I have been asked to note in my remarks that I do not speak for one of the rural electric cooperatives in Colorado—Holy Cross Electric Association with main offices at Glenwood Springs, Colo. Even though this rural electric cooperative is a member of our State Association and had members present at the meetings at which the two attached resolutions were passed, and did not at either such meeting express disapproval by voice or vote, they have now instructed us that we must not speak for them in matters of the Fryingpan-Arkansas.

We of the rural electrics of Colorado wish to express our approval of the Fryingpan-Arkansas bill as it is before you—as it was passed by the Senate. We are particularly anxious that this bill become law authorizing transmission lines as they are now authorized in the bill before you. We might further mention that we are very anxious that the report place no limitation on the Secretary of the Interior in the building of those transmission lines so authorized.

We are definitely opposed to the suggestion made by the investor-owned power companies that no transmission lines be authorized; but that they be permitted to supply them.

It probably is unnecessary for us to state our reasons for our stand. Those reasons are set forth in the exhibit A above referred to, and we believe are self-evident. The Fryingpan-Arkansas project simply cannot operate as efficiently if plant tielines and project intertie lines with other Bureau of Reclamation projects are owned apart from the ownership of the basic power plants.

We reject as completely fallacious the statement of the power companies that by having them own the lines, the taxpayers would be saved money. Obviously, those transmission lines would be built as part of the cost of the project, and the money for the building of them would be repaid—with interest.

Futher, as to the electric facilities in this and other similar projects, there is not a penny of taxpayer money—the Government does loan its credit, and there is the distinct advantage of a low interest rate; but as to electric facilities, the persons who loan the money to the Government for the building of this project—the Government simply loaning its credit—get their money back with the interest they have coming and the Government makes a small net profit in that it collects more interest than it pays.

We do not take the position of objecting to all wheeling contracts. They can be perfectly fair if all parties to the contract negotiate them independently and without duress or pressure of circumstances.

That would mean that if there is authorization in this bill for transmission lines to load centers, and if the report and the bill together, come out of Congress, with the President's signature on the bill, indicating that all customers can freely negotiate for direct power purchase or wheeling, then wheeling can perhaps be arranged fairly to all.

Further, we object strenuously to the investor-owned power companies' proposal that after the preference customers have put in their first requests for power, that they, the power companies, then take all the rest of this project on long term contracts. Our objections to that plan are also obvious I am sure.

However, suffice it to say that the rapidly growing needs for electric power on the part of the ranchers and farmers and rural people of Colorado, make it necessary that our rural electric cooperatives can increase their purchases of power year by year—without any penalty.

There is no question that all the power that will be produced by the Fryingpan-Arkansas can be sold. We don't believe that there ever has been a surplus of low-cost electric power any place in this country. For example, the Colorado-Big Thompson project was built on the prediction that there would be a great surplus of power there. As you gentlemen probably know, with the Colorado-Big Thompson project only now fully developed, there is already an acute power shortage in northern and northeastern Colorado.

The Colorado rural electric cooperatives do not get all of the Colorado-Big Thompson power by any means but in the year 1954 they purchase 250 million kilowatt-hours, and paid the Government $1½ million for them. This year, those rural electric cooperatives will buy a lot more—if they can get them—and will pay a lot more money for the increased power.

It is interesting to note that that kilowatt-hour figure is over half the estimated total available kilowatt-hour figure from the Fryingpan-Arkansas—and Fryingpan-Arkansas kilowatt-hours will not be available for some years yet. The demand from the rural electrics alone, in the Fryingpan-Arkansas territory, will be almost great enough to take the Fryingpan-Arkansas output by the time it is on the line.

It is our belief that there is a goodly margin of safety in the Bureau-projected income from the sale of electricity. I call attention particularly to the more than 20 percent of the total output, which is estimated for sale as dump and secondary power. We believe the actual operation of the project will show more "firm" and less "dump" and "secondary" than is now estimated.

Records of similar Colorado-Big Thompson project show that for the past several years there has been practically no power from that project that was not sold as "firm." That, of course, brings much greater revenue.

The Fryingpan-Arkansas should be—and undoubtedly will be—fully inter-tied to the Colorado-Big Thompson, and this should make it possible to have even a greater percentage of the total power output marketed as "firm," than either the Fryingpan-Arkansas and Colorado-Big Thompson projects could achieve separately.

Further, the Bureau of Reclamation has the authority normally to make some purchases of power with which to firm, dump and secondary. Certainly with an integrated system here—with the Colorado-Big Thompson—and with the possibility of making very limited purchases, revenue can be increased, from power sale, substantially over the Bureau's present estimate.

It has long been recognized by users of electricity from Federal, multipurpose projects, that electricity is actually paying quite a subsidy to irrigation.

And there has been acceptance of this on the part of the electricity users, for they have realized that without that subsidy to irrigation, some of the projects could not have been built.

However, we do not believe that the electric rate on which this 1955 version of the Fryingpan-Arkansas project is based—to pay out, with interest, electric phase costs in 39 years—should have been raised somewhat over the rate on which the Bureau based previously proposed Fryingpan-Arkansas projects.

We believe it is fair to allocate power costs so that a power rate will be determined reflecting all costs of production of that power, to which then may be added further subsidy for irrigation.

However, we do not hold with the idea that the electric power rate from these projects should be kept as high as possible, so as not to embarrass investor-owned power companies on their rates in the same area. I have a bit of suspicion in this instance.

Again, we wish to express our appreciation to the members of this committee for their consideration of the needs of the rural population of Colorado and neighboring States.

We need the Fryingpan-Arkansas project—and we need it just as quickly as it can be authorized and built.

Further, we believe that this is a sound investment not only in our section of the country, but a sound investment in the future of these United States, and as it should be in all "sound investments" this one is pre-determined to pay big dividends toward the future of our country's people.

And with that, I would like to pass the remainder of the time on to other witnesses of the group.

Mr. ASPINALL. Thank you very much, Mr. Austin. Without objection, the exhibits referred to will be printed in the record at this point.

(The material referred to follow:)

EXHIBIT A

RESOLUTION RE FRYING PAN-ARKANSAS PROJECT

(This resolution is directed to your attention by terms of the resolution itself, passed July 1, 1953, by the board of directors of the Colorado State Association of REA Cooperatives meeting at Denver. This board is composed of a representative of each rural electric cooperative belonging to the association.)

Whereas the Frying Pan-Arkansas diversion plan is a Bureau of Reclamation proposal to divert surplus water from the western slope of Colorado for irrigation, to reregulate the present flow of the Arkansas River, to exercise flood control, to benefit fish and wildlife, and to generate electric energy; and

Whereas the Southern Colorado Power Co. and the Public Service Co. of Colorado have submitted a joint proposal to build transmission lines between the several generation sites and for wheeling power to load centers, in lieu of proposed Bureau lines, and have proposed to purchase all excess and dump power for distribution to their own customers; and

Whereas it is advisable in the interests of efficiency of operation and continuity of service for the United States to retain interconnected transmission lines with other existing and proposed development programs, and own and operate transmission lines extending into the market centers; and

Whereas the preference customers should never be denied the opportunity of increasing their loads from time to time, a right which is denied under the commercial utility proposal; and

Whereas no saving will result to the taxpayers from the proposed elimination of transmission facilities for the reasons that such elimination will prevent the most efficient interconnection of other public facilities, and will prevent the sale of public power at its true market value through the elimination of direct sales to municipalities and cooperative associations, in violation of existing well established law, and the creation of an unjustified monopoly in the commercial utilities and will forever restrict preference customers from orderly growth by

limiting the amount of power available to preference customers to the amount such customers are initially able to absorb; and

Whereas the construction of these transmission lines by the United States is not a grant but an investment by the people of a relatively small amount which will safeguard the much greater investment of the United States in the entire project, and will assure the orderly repayment of the entire project cost; and

Whereas the adoption of the proposal submitted by the commercial utilities would greatly reduce the revenue to the project, and would jeopardize the feasibility of the project through the sharp reduction of the amount of power available for sale at firm power rates and the increase of dump power sold at unfavorable dump power rates: Now, therefore, be it

Resolved, That the Colorado State Association of REA Cooperatives urge that both Senate and House Committees on Interior and Insular Affairs, the Congress in general, and all interested and affected parties bend every effort and exert all influence possible to approve the Frying Pan-Arkansas diversion plan as presented by the Bureau of Reclamation, including construction, operation, and control by the United States, of all of the transmission lines necessary to market the available power throughout the market area.

EXHIBIT B

RESOLUTION RE FRYINGPAN-ARKANSAS PROJECT

(This resolution, directed to your attention by the terms of the resolution itself, was passed at the semiannual membership meeting of the Colorado State Association of REA Cooperatives, Colorado Springs, March 15, 1955.)

Whereas the authorization for construction of what is known as the Frying Pan-Arkansas transmountain diversion project is now before the Congress; and

Whereas the plans for said transmountain diversion include provisions for a compensatory reservoir to provide storage water for water users on the western slope of the State and contains provisions for the protection of water rights on the Frying Pan River and its tributaries; and

Whereas the completion of the Frying Pan-Arkansas diversion will provide much needed additional water for irrigation and municipal use for the farms and cities in the Arkansas River Valley: Now, therefore, be it

Resolved, That the Colorado State Association of REA Cooperatives go on record as being whole-heartedly in favor of the Frying Pan-Arkansas transmountain diversion project with full traditional preference rights to rural electric cooperatives and municipal electric systems for purchase of electric power, together with transmission lines, to take electric power from electric generation plants on said project to load centers of municipal systems and rural electric systems within reasonable transmission distance of said project, and with transmission interties to the Colorado-Big Thompson system and any other Federal systems, and that its officers and directors are hereby authorized to take any and all necessary steps in support of said project.

Mr. FAIN. Mr. Chairman, my name is Charles J. Fain. I am assistant general manager for the National Rural Electric Cooperative Association. This is Mr. Robertson, our staff engineer, who has some statements for the committee.

We would like to present this statement, and then we woud ask permission of the chairman and the committee to put in the record two resolutions found at the back of the statement and one table, a printed table, showing the rural power growth of the rural electric cooperatives in this area. With the permission of the chairman, we would like to have those submitted for the record.

My name is Charles J. Fain. I am assistant general manager of the National Rural Electric Cooperative Association which is the national service organization for 90 percent of the REA financed electric-type borrowers in the United States and Alaska.

The rural electric systems, nationally, through their service organization, and particularly those systems in the Arkansas Valley section of Colorado, are in wholehearted support of authorization of the

Frying Pan-Arkansas project, provided that an equitable portion of the benefits from the hydroelectric power features of the project are afforded to them as preference customers.

Interest of the rural electric cooperatives: There are 7 rural electric cooperatives located within a 50-mile radius of the proposed powerplants and transmission system of the Frying Pan-Arkansas project. During the calendar year 1954, these 7 systems purchased approximately 91.42 million kilowatt-hours of energy for distribution to their consumer members, and paid an average wholesale rate of approximately 9.4 mills per kilowatt-hour for this energy. Some of the cooperatives paid an average rate as high as 12.5 mills.

The loads of these rural electric systems are growing at a rate of approximately 3 times that of electric utility systems throughout the country. Between December 31, 1953, and December 31, 1954, the total consumption of these 7 systems increased from 74.73-million to 91.42-millon kilowatt-hours per year, which represents an annual average increase of approximately 22.3 percent. This 22.3 percent annual increase corresponds to a doubling of cooperative loads every 3½ years.

We are attaching to this statement a tabulation of the energy requirements of these systems by calendar year from 1944 to 1954. The study also indicates our best estimates of the future load growth of these systems.

Bureau of Reclamation estimates indicate that with an installed capacity of 104,800 kilowatts of hydroelectric power, there will be available from the powerplants of the proposed Fryingpan-Arkansas project, 370-million kilowatt-hours of annual firm salable energy. Thus, the loads of these 7 cooperatives alone will probably be equal to the anual firm salable output of the project by the time it is completed. Assuming that firm energy is made available from it at 6 mills per kilowatt-hour, as is now estimated, these 7 cooperatives would save $307,940 per year based on their 1954 consumption. In view of their increasing loads, these systems will realize much greater annual savings when project power actually becomes available.

It is not unrealistic to predict that the ultimate annual savings to these 7 systems will be equal or exceed their entire cost of energy at the present time if the firm salable output of the project is made available to them. Thus, the interest of the rural electric systems in the Arkansas Valley area of Colorado is apparent.

Not only will the project mean savings in the cost of wholesale power, but the additional development of the water and power resources of the area will materially stimulate economic development and, therefore, encourage the continued vitality and strength of these rural electric systems.

Rural electric cooperatives as preference customers: Section 1 of H. R. 412, the legislation under consideration, specifically authorizes, as a primary purpose of the Fryingpan-Arkansas project, the generating and transmitting of hydroelectric power and energy, and authorizes the Secretary to construct and operate the project pursuant to the Federal reclamation laws.

As the committee well knows, the reclamation laws provide that power from the hydroelectric features of multiple-purpose projects shall be marketed in a manner that provides a preference of availability to municipalities, public bodies, and rural electric cooperatives.

The preference language of the reclamation laws has traditionally been interpreted to mean that where both preference and nonpreference customers seek to purchase power and energy from a project, a duty is imposed upon the Secretary to offer the power first to the preference customers.

Traditionally, also, the preference on availability of Federal power has been of a continuing nature, and the power sold to nonpreference agencies has generally been committed on a withdrawable basis so that as preference customers loads increase, power and energy surplus to the initial needs of the preference customers, and initially sold to nonpreference customers, may be withdrawn in accordance with prearranged schedules for assignment to meet the expanding loads of the preference customers.

The need for Federal transmission facilities: The Department of the Interior has consistently found it desirable to build at least some transmission facilities in connection with almost every power producing project it has undertaken. First, it is virtually impossible to market power on an economical basis and in accordance with anticipated repayment schedules from an isolated hydroelectric project.

Only when several hydroelectric units are integrated through a comprehensive transmission system is it possible to market appreciable quantities of firm energy from the system and for the Federal Government to avoid being placed in a decidedly disadvantageous position in the power sales market.

Let me give you one example. The Bureau of Reclamation recently completed the 50,000-kilowatt Canyon Ferry hydroelectric generating station near East Helena, Mont. There is no transmission system associated with the Canyon Ferry powerplant except for a very short tieline which connects the plant to the system of the Montana Power Co. at East Helena, Mont.

On page 1025 of part 2 of the House hearings on Interior Department appropriations for fiscal 1955, there appears a chart showing the power installation and the rates for firm and on-firm energy to be sold from the Canyon Ferry project. This chart indicates the rate for firm energy from the project to be 5.5 mills, and for nonfirm energy, 3.0 mills.

Now let us see what the Interior Department was able to realize from the sale of power from the project during the calendar year 1954 just concluded. During that year, a total of 161,936,610 killowatt-hours were sold from the project. Of that amount, 142,734,335 kilowatt-hours, representing 89 percent of the project output, was sold to the Montana Power Co., not at the 5-mill rate anticipated for firm energy, not at the 3-mill rate anticipated as the price for nonfirm energy, but at a rate of 2.5 mills per kilowatt-hour—a dump energy rate. It is obvious that at this project, the Bureau of Reclamation, in the absence of an adequate transmission system, is selling firm energy at dump rates.

Moreover, the Department has usually found itself unable to pass to the preference customers under the law any substantial portion of the benefits of low-cost power from its hydroelectric units in the absence of an adequate transmission system.

The preference customers are generally small electric distribution systems. Their financial resources are limited and their individual needs for electric power are relatively small. It is, therefore, at

the very least uneconomic and, in most instances, financially impossible for them to construct the high voltage transmission facilities necessary to connect their distribution systems to the Federal busbar at the dams.

Therefore, in those instances where Federal transmission is nonexistent, the local investor-owned utility network is the only prospective purchaser of Federal power. These utility company networks are usually in existence at the time dam construction is started, and in many instances, actually supply construction power for the project.

The companies are, therefore, in an ideal bargaining position for negotiating purchase of the entire output of the project. Therefore, the utility companies in general seek to forestall construction of any Federal transmission facilities in order that they may enjoy a uniquely advantageous position in purchasing the power, and thereby drive down the price.

With respect to the construction and operation of the Fryingpan-Arkansas Project in Colorado as proposed in H. R. 412, representatives of the Public Service Co. of Colorado and the Southern Colorado Power Co. which operate generation, transmission, and distribution facilities in the vicinity of the project have appeared in previous years, and we assume will appear before the subcommittee this year to ask that, in reporting the legislation, the committee either amend the bill itself or include in its report such language as would preclude the Secretary of the Interior from building any transmission facilities as a part of the project without first securing what would effectively be power company approval.

The proposal of the power company: Let us examine the power company proposal. What are the companies asking the committee to do in authorizing the Fryingpan-Arkansas project. First, the Public Service Co. of Colorado and the Southern Colorado Power Co. are asking the subcommittee to place such language in the authorizing bill as would conclusively preclude the Secretary of the Interior from building any transmission lines in connection with the project, provided suitable wheeling or similar contractual arrangements could be negotiated with the companies for the disposition of project power.

Presumably, this means that if the companies contracted to wheel the power to preference customers for the account of the Government as is now done under existing contracts in Colorado, or in the alternative, contracted to purchase the entire project output at the busbar, obtain title to the power, and sell related amounts of firm energy to the rural electric systems, the Secretary could build no transmission whatsoever.

Many of the rural electric systems in Colorado and in other States are receiving Federal power pursuant to satisfactory wheeling type agreements. Under a wheeling agreement, the preference customers are customers of the Government and the utility company network serves as a common carrier.

However, any alternate proposal whereby the companies obtain title to the entire output of the project at the busbar in exchange for which they deliver to preference customers related amounts of firm power is entirely unacceptable to the rural electric systems.

A second general proposition of the companies' proposal involves a basic reversal of established principles of preference law application. The companies propose that all power and energy from the project

be sold at the busbar at such time as the power becomes available. The companies would grant preference at that time for such of the power as is required to meet the immediate needs of the preference customers.

Any power and energy from the project that remained above the immediate needs of the preference customers would be sold to the companies under long-term contracts. Thus, as the loads of the preference customers increased, there would be no additional power available to them for meeting their load growth.

Let us assume for example that the Fryingpan-Arkansas project were placed in operation as a unit today. There would be an estimated 370 million kilowatt-hours of firm salable energy available each year. The present load of the cooperatives in the area is approximately 100 million kilowatt-hours per year.

It is the proposal of the companies that the rural electric cooperatives would be entitled to preference in the sale of this 100-million kilowatt-hours per year, but that the entire remaining 270-million kilowatt-hours would be immediately sold to the nonpreference customers on a long-term basis. Our studies show that the cooperative loads are doubling every 3½ years.

Therefore, in another 3½ years, these same cooperatives would require 200 million kilowatt-hours of energy annually, but under the companies' proposal, they would not be entitled to preference in securing this additional power from the Federal system, but would have to purchase it from the companies at standard company rate schedules. This, we contend, is a basic violation of the preference principle of power marketing.

The company proposal provides that preference customers may contract either directly with the Federal Government or with the companies, in accordance with the policy the Department of the Interior has ultimately determined. Any agreement for the disposal of this power to preference customers which does not establish the preference customers as customers of the Government, is, we think, not consistent with established Federal power marketing policy as set by the Congress.

Obviously it is to the advantage of the companies to retain all of their existing customers and to gain additional customers if possible. It would, therefore, be reasonable to expect the companies to undertake, in their negotiations with the Department of the Interior, to secure a marketing agreement which would bind preference customers to remain as customers of the companies, rather than becoming direct purchasers from the Government.

The rural electric systems in general feel that their best security for an adequate future power supply at reasonable rates lies in being customers of the Government, and in two instances, they have already rejected Interior Department proposals which provide for disposition of Federal power to preference customers through private utility companies as intermediate holders of title to the Federal power.

The companies hold forth as one of the principal benefits of their proposal the fact that the use of their facilities in the marketing of power may be accomplished without any duplication of facilities. Yet, almost in the same breath, the companies offer to duplicate most of their entire existing system from Leadville to La Junta in the

Arkansas Valley. Actually, the companies, according to their own map, have no line at all from Salida to Canon City at present.

It is not, therefore, a question of whether or not a second transmission system is built to supplement the function of the existing company system. Rather it is a question, evidently, as to whether or not the required additional transmission lines are to be built and controlled by the Bureau of Reclamation or the companies. A second transmission system will apparently be required no matter who builds it.

The companies, in their proposal to the subcommittee, emphasize the fact that if their proposal is accepted and they are allowed to build the transmission facilities required to be associated with the project, a savings of $4,750,000 in the construction costs of the project will be realized, which they claim would be equivalent to an annual saving of $313,830.

We contend that whether the Bureau of Reclamation or the companies build the necessary additional transmission facilities for the Arkansas Valley, the power users will ultimately pay the charges on such a transmission system. If the company builds the project, the charges will be amortized by the rate payers, and if the government builds the transmission system, the charges will likewise be borne by those who purchase the power from the project.

The Bureau of Reclamation would finance transmission construction, as it does other parts of its program, at low interest rates commensurate with the security offered by United States Government obligations.

The figure of $313,830 which appears on page 11 of the companies' proposal, does not represent annual savings at all, but is merely the companies' estimate of the annual cost of these facilities to the Government.

To obtain a true picture of any cost differential between the construction of transmission lines by the company as contrasted with construction by the Bureau, it would be necessary to balance the $313,830 figure against what the annual cost to the companies of similar construction would be, because the rate payers will pay for this transmission regardless of who builds it.

Let us examine the companies' calculations which appear on page 11 of their current proposal and allege to show that there would be an annual saving of $313,830 under their plan. The largest single component of this $313,830 is a $142,500 item for interest on investment of 3 percent.

Actually, under the language of H. R. 412, the interest on Federal investment would not be 3 percent. It would be probably about 2.5 percent. By contrast, commercial utility companies customarily claim they must realize 6 percent on their investment to remain healthy.

We feel the company figures are confusing and would like to submit the following table which actually shows that the annual cost of the line will be higher under the company plan.

Cost of transmission facilities under company proposal compared to cost of Federal construction

	Annual cost under company plan	Annual cost for Federal construction
Investment required	$4,750,000	$4,750,000
Interest on investment at 2.5 percent		119,000
Interest on investment at 6 percent	285,000	
Amortization by sinking fund at 2.5 percent over 50-year period (.0089)		48,800
Amortization by sinking fund at 6 percent over 50-year period (.003)	16,340	
Operation and maintenance	75,750	75,750
Interim replacement	53,305	53,305
Totals	430,395	296,855

These figures which show that Federal construction of transmission would result in annual savings to power users of $133,540 are based on the companies' calculations shown on page 11 of their proposal. The difference between the result we obtain and the claim of the companies is due solely to the fact that we apply the interest rate provided in the bill to Federal construction, and a 6-percent rate to power company construction.

Conclusion: In conclusion, Mr. Chairman, we ask that your committee approve H. R. 412 without binding the hands of the Secretary of the Interior insofar as transmission is concerned, before construction of the project ever begins.

We feel that it is in the interest of the rural electric cooperatives and the Federal Government in the marketing area that there be no restrictions in the basic legislation which would hamper the Department of the Interior in marketing the power in accordance with traditional preference treatment.

We would like to include as part of this statement, Resolution No. 5–F specifically in support of the Fryingpan-Arkansas project. This resolution was unanimously passed by the 13th Annual Meeting of Members of the National Rural Electric Cooperative Association on February 17, 1955, in Atlantic City, N. J. We would also like to include a copy of a resolution specifically in support of the Fryingpan-Arkansas project unanimously passed at the annual meeting of the Colorado Association of REA Cooperatives at Delta, Colo., on September 21, 1954.

Mr. ASPINALL. Unless there is an objection, the resolutions and the table will be placed in the record in the usual manner. Hearing none, it is so ordered.

(The material referred to follows:)

RESOLUTION ADOPTED BY THE 13TH ANNUAL MEETING OF MEMBERS OF THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

RESOLUTION NO. 5–F

Whereas, the Fryingpan-Arkansas project proposed for construction in Colorado would bring much needed electric power to the farmers and ranchers of that area and use excess western slope water for re-regulation of the present flow of the Arkansas River, flood control, added fish and wildlife development, improved recreational facilities and domestic, industrial, and irrigation water: Now, therefore, be it

Resolved, That we endorse the authorization and construction immediately of the Fryingpan-Arkansas project, with full traditional preference rights to rural

electric cooperatives and municipal electric systems for purchase of electric power, together with transmission lines, to take electric power from electric generation plants on said project to load centers of municipal systems and rural electric systems within reasonable transmission distance of said project, and with transmission inter-ties to the Colorado-Big Thompson system and any other Federal systems.

RESOLUTION ON UPPER COLORADO RIVER, FRYING PAN-ARKANSAS, AND GLENDO PROJECTS

Unanimously passed at the Annual Meeting of the Colorado State Association of REA Cooperatives, Delta, Colo., September 21, 1954

Whereas the Frying Pan-Arkansas diversion plan is a Bureau of Reclamation proposal to divert surplus water from the western slope of Colorado for irrigation, to reregulate the present flow of the Arkansas River, to exercise flood control, to benefit fish and wildlife, to improve recreation facilities, to provide additional domestic water and to generate electric energy; and

Whereas the Southern Colorado Power Co. and the Public Service Co. of Colorado have submitted a joint proposal to build transmission lines between the several generation sites and for wheeling power to load centers, in lieu of proposed Bureau lines, and have proposed to purchase all excess and dump power for distribution to their own customers; and

Whereas it is advisable in the interests of efficiency of operation and continuity of service for the United States to retain interconnected transmission lines with other existing and proposed development programs, and own and operate transmission lines extending into the market centers; and

Whereas the preference customers should never be denied the opportunity of increasing their loads from time to time, a right which is denied under the commercial utility proposal; and

Whereas no saving will result to the taxpayers from the proposed elimination of transmission facilities for the reasons that such elimination will prevent the most efficient interconnection of other public facilities, and will prevent the sale of public power at its true market value through the elimination of direct sales to municipalities and cooperative associations, in violation of existing well established law, and the creation of an unjustified monopoly in the commercial utilities and will forever restrict preference customers from orderly growth by limiting the amount of power available to preference customers to the amount such customers are initially able to absorb; and

Whereas the construction of these transmission lines by the United States is not a grant but an investment by the people of a relatively small amount which will safeguard the much greater investment of the United States in the entire project, and will assure the orderly repayment of the entire project cost; and

Whereas the adoption of the proposal submitted by the commercial utilities would greatly reduce the revenue to the project, and would jeopardize the feasibility of the project through the sharp reduction of the amount of power available for sale at firm power rates; Now, therefore, be it

Resolved, That the Colorado State Association of REA Cooperatives urge that both Senate and House Committees on Interior and Insular Affairs, the Congress in general, and all interested and affected parties bend every effort and exert all influence possible to approve the Frying Pan-Arkansas diversion plan as presented by the Bureau of Reclamation, including construction, operation and control by the United States, of all of the transmission lines necessary to market the available power throughout the market area.

Annual energy consumption of rural electric cooperatives in Fryingpan-Arkansas service area

[In millions of kilowatt-hours]

	Number	1944	1946	1947	1949	1950	1951	1952	1953	1954
COLORADO										
San Isabel Electric Association, Inc.	25	0.40	0.83	1.09	1.74	2.01	2.18	2.47	2.72	2.75
Mountain View Electric Association, Inc.	37	1.33	2.62	3.18	6.36	8.15	9.46	12.12	14.28	13.74
Gunnison Cooperative Electric Association, Inc.	18	.38	.44	.53	.72	.91	1.08	1.16	1.16	.97
San Luis Valley REC, Inc.	14	1.33	4.50	3.80	4.29	9.55	15.25	7.81	17.53	24.30
Intermountain Electric Association	16	1.49	4.68	6.29	9.98	12.19	13.66	15.65	17.36	21.34
Southeast Colorado Power Association	17	12.45	7.77	8.27	10.88	11.73	13.50	17.74	20.78	24.75
Sangre DeCristo Electric Association, Inc.	35	1.74	2.36	2.64	2.05	1.99	2.05	2.50	2.90	3.57
Total		19.12	23.20	25.80	36.02	46.53	57.18	59.45	74.73	91.42
Annual percent increase			21.3	11.2	39.6	29.2	22.9	4.0	25.7	22.3

Estimate of total energy requirements, 1955–70,[1] in millions of kilowatt-hours

Year	Total	Year	Total	Year	Total
1955	111	1961	366	1967	1,205
1956	136	1962	446	1968	1,470
1957	166	1963	544	1969	1,790
1958	202	1964	663	1970	2,180
1959	247	1965	810		
1960	301	1966	988		

[1] Based on annual increase of 22 percent.

Mr. FAIN. Mr. Chairman, due to the lateness of the hour, I would just simply like to summarize the position of the National Rural Electric Cooperative Association insofar as the Fryingpan-Arkansas project is concerned, and to say that we are completely in accord with the bill, H. R. 412, which would authorize this project.

Very briefly, we would simply like to point out the need for power in that area and to reassure the committee that so far as the Rural Electric Cooperatives are concerned in the area, there is a ready market for the power.

To make that point, Mr. Chairman, we will simply say that there are seven rural electric cooperatives in the Fryingpan-Arkansas project area. We have prepared for the committee a study as found at the rear of the statement, showing the rural load growth of the rural electric cooperatives in that area. We thought it might be of interest to members of the committee in seeing whether or not there is a market for the power that would come from the Fryingpan-Arkansas project.

Very briefly, that study shows, Mr. Chairman, that the rural electric cooperatives in that area are growing tremendously. In fact, their load growth shows an average increase of about 22 percent annually. This means that the load growth of those rural electric cooperatives in that area is doubling every 3½ years.

At the present time, the study shows that they are using about 91.4 million kilowatt-hours annually, these 7 rural electric cooperatives there in southeast Colorado.

It can be readily determined from the study that with this increase of 22.5 percent annually, within a very short time—we have projected

the study, incidentally, to 1970—these 7 rural electric cooperatives in that area will be using over 2 billion kilowatt-hours annually.

What price are these rural electric cooperatives paying for that power? At the present time, their average rate is 9.4 mills per kilowatt-hour. That ranges all the way from around 6 mills up to around 12 mills per kilowatt-hour.

Looking at the Fryingpan-Arkansas project, it is determined that the capacity of the project in kilowatt-hours, the kilowatt capacity, is about 104,000, and the annual output of the project is about 370 million kilowatt-hours annually. That is, upon completion of the project.

Thus, we can see that if there were no other power users in the area besides these seven rural electric cooperatives, they would take the entire output of the Fryingpan-Arkansas project.

The price, it has been determined, would be about 6 mills per kilowatt-hour. So I think there can be no question that there is a ready market for that power, when it comes on the line from the Fryingpan-Arkansas project.

Their load growth shows that they will need more power than will exist there, and the price will be cheaper than they are now paying.

I would just like to very briefly refer to two other parts of the statement, Mr. Chairman, and that is that H. R. 412 is drawn to comply to the Reclamation Project Act of 1939 insofar as the marketing of the power is concerned. It endorses the preference clause to public bodies, municipalities, and rural electric cooperatives, as is found in the Reclamation Project Act of 1939, and it also authorizes the building of transmission, if it is needed, by the Department of Interior.

I think it is important to the rural electric cooperatives in the area that the preference clause be preserved, and this bill does that; and furthermore, that if there is a need for transmission, the Department of Interior, acting through the Bureau of Reclamation, will have the authority to build such transmission as is needed.

I think that that would complete our statement, Mr. Chairman. And we certainly want to thank the committee for allowing us the time to appear before you and make this statement.

Mr. ASPINALL. Thank you very much.

Mr. Moore, do you have a statement?

Mr. MOORE. I have no prepared statement. My name is Robert L. Moore, director of San Isabel Electric at Pueblo. And in view of the time, I am going to pass.

Mr. ASPINALL. The Chair would like to know whether or not you approve the project.

Mr. MOORE. Oh, I wouldn't be here if I didn't. Yes, I heartily endorse the project. And not only that, but speaking for the boards of the three cooperatives that are most involved in this, I can say that all three of the cooperatives heartily endorse and work very hard for and donate to the campaign fund for the project.

Mr. ASPINALL. Thank you, Mr. Moore.

Now, if Mr. Patterson and Mr. Porter will bring their chairs and come up, will you gentlemen give way and let them sit to your right?

Mr. Patterson, as I understand it, you and your associates favor the project, but you would desire to be permitted to build as many of the transmission lines as you folks might think necessary for your companies which are able to build them, to build; is that correct?

QUESTION PERIOD OF L. R. PATTERSON, W. C. PORTER, JR., CHARLES J. FAIN, H. VANCE AUSTIN, JAMES E. KANE, AND ROBERT L. MOORE, AND CHARLES ROBERTSON

Mr. PATTERSON. Yes, that is right, sir, with this one understanding: that the Secretary of Interior would have to be satisfied that he had a contract with us that was equitable. And if he did not think so, he could build his own line.

Mr. ASPINALL. Now, speaking for the Colorado group, it is your position, speaking for those especially who are affected by this legislation, that you people would like to see the authorization legislation left in the usual manner, and permit the Government to build all transmission lines that the Government, itself, thinks is necessary to distribute the preferential power. Is that correct?

Mr. AUSTIN. That is a correct statement, as embodied in the resolution that we put in, and we think it is borne out by the actual cost studies in the testimony Mr. Fain put in.

Mr. ASPINALL. Is this correct: that that is about the only difference in the statement presented by the commercial companies and the REA's in connection with this particular legislation? I think there is general agreement. The Chair recognizes the gentleman from Florida, if he has any questions.

Mr. HALEY. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. If I am correct, Mr. Fain, about the exhibit which is attached to your statement, I am very much interested in it, because you project this to 1970, wherein you estimate you will use 2,180 million kilowatts in 1970 in the REA. Is that correct?

Mr. FAIN. Yes, sir. That is upon the assumption that the increase would be upon the basis that it has been in the past, Congressman Saylor, that is, approximately 22 percent annually.

Mr. SAYLOR. Well, now, when did you first organize an REA in Fryingpan-Arkansas service area?

Mr. FAIN. I cannot answer that.

Mr. MOORE. 1939.

Mr. FAIN. However, Congressman, if I could say this: This study is based on the period from 1944 to 1954, a period of 10 years. We have records for that period, as found and given out by REA.

Mr. SAYLOR. Now, Mr. Moore, you are a director in the first REA that was organized in that area?

Mr. MOORE. No, I think that was the third one organized in the area.

Mr. SAYLOR. I might ask this of the general manager of the REA's in that area.

What percentage of the population do you now serve, that is, percentage of the population of the people in the entire area of the Fryingpan-Arkansas storage area?

Mr. AUSTIN. Percentagewise, I would not know, sir. I would say in this area 90 percent of the people now have electricity. But from the commercial utilities, or the nonprofit utilities, I would not know what the percentage is, sir.

Mr. SAYLOR. Could you tell me the increase in the number of customers that the seven REA's that you represent have had from 1944 to 1954?

Mr. AUSTIN. May I suggest that Mr. Kane is manager of one of those cooperatives, and Mr. Moore is director of another one.

Mr. SAYLOR. Mr. Kane, could you answer that for all of them, if you know it; and if not, for the one that you represent?

Mr. KANE. Mr. Saylor, our greatest growth has occurred since World War II. So I would say that we have probably doubled the number of consumers that we serve in the last 7 or 8 years. Our greatest growth has occurred in this last 7 or 8 years.

Mr. SAYLOR. In other words, it has occurred in this 10-year period which Mr. Fain has attached to his exhibit?

Mr. KANE. Yes, sir, World War II delayed our construction, our area coverage program, from about 1942 until about 1946. Then there were several years of shortage of materials there, which further delayed it. So the growth has been in the last 10-year period.

Mr. SAYLOR. Now, in the area which your REA serves, which is—what?

Mr. KANE. The Salida. The northern part of the valley—the northwest section.

Mr. SAYLOR. In that area, do you furnish service to all of the people that are in there, or substantially all of the people that are in the area?

Mr. KANE. We furnish service to the rural people in the area and one sizable, town, the town of Una Vista, which has a population of about 800 presently. The larger cities are served by the public service company in the area.

Mr. SAYLOR. Now, in that rural area, do you agree with Mr. Fain's statement that about 90 percent of the people in that area have electricity on their farms, their properties?

Mr. KANE. Yes, sir. Our particular area has a higher coverage than that. It is in excess of 95 percent of the rural area that has electric service.

Mr. SAYLOR. The remaining 5 percent are so far removed that you cannot serve them, or it is not profitable to serve them?

Mr. KANE. I think that is right. The question of economic feasibility is very prevalent there.

Mr. SAYLOR. Now, has your consumption increased in accordance with that described by Mr. Fain as doubling over the past number of years?

Mr. KANE. Yes, sir. We have increased our loads on our own particular cooperative about 35 percent in the last 18 months.

Mr. SAYLOR. And what is that due to? What factors?

Mr. KANE. Increased use of the part of the rural people. They are finding that electricity is a much more economical and more efficient servant, and they are putting it to additional uses. They have quit using electricity just for lights. They are cooking with it. They are refrigerating with it. They are finding so many more uses for electric power. There are milking machines. We have a number of dairy farmers in our area. And it is just an overall expansion of the use of electricity in the rural areas.

Mr. SAYLOR. Now, why do you object to the proposal of the public service companies of Colorado to build the transmission lines which they have proposed here?

Mr. KANE. Why do we object to them?

Mr. SAYLOR. Yes.

Mr. KANE. Our experience has been that we should advocate interconnections between the various Bureau projects.

Mr. SAYLOR. The various rural projects?

Mr. KANE. The various Bureau of Reclamation projects.

Mr. SAYLOR. Well, in many other areas the Bureau and public utilities have cooperated and built lines from transmission lines. Some the public utilities have built. Some the Government has used. And they have intermingled through a grid. Why do you object to the same policy here?

Mr. KANE. We have wheeling arrangements presently within our area, Mr. Saylor, and they are working out.

Mr. FAIN. Mr. Saylor, if I might interject a thought there, I didn't want to be misunderstood, and I thought my statement made it clear that we are perfectly in agreement with proper wheeling contracts, and some of those have been made in Colorado. They are working at this time. And I think that these gentlemen can testify to that, both Mr. Paterson and the rural electric people. And if those wheeling arrangements can be made to work satisfactorily, to serve these rural load centers, certainly it is not our position that that cannot be achieved.

Mr. SAYLOR. Well, now, I am delighted to hear you say that.

Mr. MOORE. We have recently entered into an agreement with the Southern Colorado Power Co., wherein they are building a line, 65 miles of line, for the wheeling of power to the rural electrics. That is to the Southeast Electric Power Association principally. And they are building the line for the wheeling of that power.

Mr. SAYLOR. I am delighted to have you two gentlemen straighten out this situation, because I had understood, from preliminary statements, that you were objecting to the private utilities building the powerlines even though proper wheeling contracts could be arranged.

Mr. FAIN. I don't recall that I made that statement. Neither do I recall that it is in my written statement, Congressman Saylor.

What we are saying is that we are in favor of H. R. 412 precisely as it is written, and we are in favor of the Bureau of Reclamation having the authority to construct lines if the Bureau finds it necessary to do so. That is our position on this matter.

Mr. AUSTIN. Mr. Chairman, the written statement that you have before you is much the same, that we are familiar with the wheeling arrangements in Colorado and we do not have objection to them if they can be arrived at by all parties independently coming to a conclusion and coming to an arrangement for wheeling. However, I wonder if we are not getting off on two different things. The bill itself calls for three-hundred something miles to interconnect the various power projects on this project and then to interconnect the project north with the Big-Thompson project. It is very definitely our feeling from the Colorado State association as expressed in these resolutions that the Bureau must own its own intertie lines between its own powerplants and this project, and the project to the north. Now, it is those exact lines, too, that the commercial power companies would like to own. We are definitely at issue on those lines.

As to the matter, then, of wheeling from this project to the load center, taking power from the Fryingpan-Arkansas, for instance, out

60 miles to La Junta to the base of operations of one of these rural electric cooperatives, or south into New Mexico to some of those—we feel that those lines are ones that are subject to the possibility of a wheeling arrangement if it can be worked out satisfactorily.

Mr. SAYLOR. Well, can your constitutents, or your customers, tell the difference between a kilowatt of power produced by the Bureau of Reclamation and a kilowatt of power produced by a steam plant down here by the public utilities?

Mr. AUSTIN. Only in the bill that we receive for it, sir.

Mr. SAYLOR. I am not asking you whether you can tell. I am asking you whether or not your customers can tell.

Mr. AUSTIN. Of course not. The kilowatts are the same. But there is a difference in the cost, sir.

Mr. SAYLOR. That is all.

Mr. CHENOWETH. I want to comment on the situation that exists in Colorado between the REA association and the private utilities. A very happy and cordial and healthy situation exists, as evidenced recently when three REA groups have gone together and obtained money from the Government to build a powerplant and have leased the same to the Southern Colorado Power Co. for a period of years in order that the REA's might receive cheaper power. I cannot refrain from commenting on this significant development, and I want to compliment and commend both the private companies and the REA cooperatives. This splendid cooperation has been very helpful to the farmer in obtaining electricity in Colorado. All of you deserve great credit for what has happened.

Mr. ASPINALL. Thank you very much, representatives of the commercial power interests and representatives of the public power interests, or REA interests, rather. I think the committee understands what is involved and will take it into consideration in any decision made.

There is a quorum call at the present time that necessitates the presence of the members of the committee on the floor of the House. The committee will adjourn until 9:30 tomorrow. Thank you very much.

(Whereupon, at 4:15 p. m., the subcommittee adjourned, to reconvene at 9:30 a. m., Thursday, May 12, 1955.)

FRYINGPAN-ARKANSAS PROJECT, COLORADO

THURSDAY, MAY 12, 1955

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D. C.

The subcommittee met, pursuant to recess, at 9:30 a. m., in the committee room, New House Office Building, Hon. Wayne N. Aspinall (chairman) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs will now be in session for further consideration of H. R. 412 by Congressman Chenoweth of the Third Congressional District of Colorado.

We were unable to get to the witnesses for the Water Development Association yesterday, and we adjourned with the understanding that they would be called for the first 30 minutes this morning, at the conclusion of which the witnesses in opposition will be called.

The House will be in session at 11 this morning. It is possible that this committee will be able to stay in session until 15 or 20 minutes after 11. It is hoped that we will be able to finish with the witnesses from the district who are in opposition and that only those witnesses appearing for southern California interests will be left, and they may be called at any time later on if it is desired.

The Chair has a telegram under date of May 11, 1955, signed by James G. Patton, president of the National Farmers Union, stating the endorsement of that organization without reservation to the legislation now before us. Unless there is an objection this will be made a part of the record at this point in the hearing.

Hearing no objection, it is so ordered.

(The telegram referred to follows:)

WASHINGTON, D. C., *May 11, 1955.*

Hon. WAYNE ASPINALL,
Chairman, Subcommittee on Irrigation and Reclamation, House Interior Committee, House Office Building, Washington, D. C.:

We endorse without reservation H. R. 412 which would authorize the construction, operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas project in Colorado and urge the committee to report the bill without amendment.

JAMES G. PATTON,
President, National Farmers Union.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth, to present the next witnesses.

Mr. CHENOWETH. Mr. Chairman, I want to thank you for your consideration in arranging for this early meeting this morning so we can conclude with the witnesses for the proponents of this project.

The witnesses for the Water Development Association of Southeastern Colorado will appear at this time. They are:

Mr. Charles H. Boustead, who is president of the Association, also president of the Pueblo Chamber of Commerce, and a member of the Pueblo City Council.

Mr. Damian Ducy, a former president of the Association, and member of the executive committee.

Mr. Harold H. Christy, a director of the Association, and also a director of the National Reclamation Association.

Mr. Charles J. Beise, who has been counsel for this Association for a number of years.

These four gentlemen will conclude the witnesses in support of this legislation.

Mr. ASPINALL. If you gentlemen will take the witness table there and present your statements.

STATEMENT OF CHARLES H. BOUSTEAD, PRESIDENT, WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO

Mr. BOUSTEAD. My name is Charles H. Boustead. I serve as president of the Water Development Association of Southeastern Colorado, president of the Pueblo Chamber of Commerce and am an elected member of the Pueblo City Council.

I speak to you today as a representative of some 300,000 residents of the great State of Colorado who reside in the Valley of the Arkansas River. Our organization, known as the Water Development Association of Southeastern Colorado, reaches from the top of the Continental Divide to the Kansas border, a distance of over 300 miles.

As you perhaps saw in the March 14th edition of Life magazine, our people have united in a dramatic campaign supporting the Fryingpan-Arkansas diversion project.

From farm to city, from hamlet to industrial center, and from churches, labor groups, and farm granges, we have secured signed testimonials from 14,518 people who realize their very future depends upon additional water.

I am not speaking in generalities here today—I have brought these signed statements with me, and ask that you read and count them, if you so desire.

The cities of Pueblo and Colorado Springs, which by Colorado law must take specific action, have by ordinance pledged support of the Fryingpan-Arkansas diversion project and to become a part of the proposed conservancy district. These cities have agreed to impose upon themselves the necessary taxation to support the conservancy district which will be organized to administer the Fryingpan project. Similar cooperation has been assured from cities and towns along the river from Leadville to Holly, Colo.

I have been delegated by these communities to present to you their petitions and resolutions. They come to you from 16 city councils, town boards, and county commissioners, 12 senior and junior chambers of commerce, 19 Rotary, Elks, Lions clubs and American Legion posts, 14 civic organizations, clubs, and sportsmen's clubs, and 12 labor organizations.

The Arkansas Valley of Colorado offers a stronghold of protection for our Nation. Here, in the sheltered protection of the Continental

Divide we will be able to produce sizable quantities of food, steel, fuel and shelter in time of disaster; provided, of course, that Colorado River water which is now flowing wastefully to the Pacific Ocean can be captured and stored for such use.

I speak to you from the hearts of our people. It is not their desire to deprive anyone of water. We will not take a drop of water from the western slope of Colorado until we first build the replacement reservoir to provide storage and control runoff at Aspen. We do not, in any sense of the word, desire to take water that is needed by our good neighbors. We do, however, desire to capture snow runoff at the crest of the Continental Divide and place that water in storage for the best use of all concerned.

My people, too, are particularly interested in controlling the flood runoff of our Arkansas River. Floods occur every spring and have since the beginning of time. We know full well the series of dams proposed in the Fryingpan project will stop this waste, harness this water for most economical use, and provide additional wealth and protection for our great Nation.

The technical aspects of this project have been stressed by other members of our group. I come before you—not as a politician—not as a "promoter" but as a spokesman for these honest, God-fearing Americans who have asked me to bring their signed petitions before you.

Mr. Chairman, I have here a number of resolutions that have been sent in to us that I would like to submit for the record, if possible.

Mr. ASPINALL. Permit the Chair to see the resolutions.

Mr. BOUSTEAD. Yes, sir. [Handing documents]

Mr. ASPINALL. Are they all similar, Mr. Boustead?

Mr. BOUSTEAD. They represent trade organizations, labor organizations, and various other groups. The language is not the same, sir.

Mr. ASPINALL. For the sake of the record, would it be possible for our staff member to make a list of them and put that list in the record, and then have these in the file?

Mr. BOUSTEAD. Certainly.

Mr. ASPINALL. Unless there is an objection, that will be the procedure.

Hearing no objection, it is so ordered.

(The documents described above were submitted at hearing before Subcommittee on Irrigation and Reclamation on Thursday, May 12, 1955, by Mr. Charles H. Boustead of Pueblo, Colo.)

(Mr. Aspinall ordered these documents placed in the committee file and to merely list them in the record.)

(The list referred to follows:)

(Resolutions favoring enactment of H. R. 412 from: National Farm Loan Association of Pueblo, Colo.; Local No. 113, International Brotherhood of Electrical Workers; Pueblo Chamber of Commerce; Colorado State Federation of Labor; Colorado State Association of REA Cooperatives; Holbrook Mutual Irrigating Co.; 16 Resolutions from city councils, town boards and county commissioners; 12 Resolutions from senior and junior chambers of commerce; 19 Resolutions from Rotary, Elks, and Lions clubs, and from American Legion posts; 14 Civic organiations and clubs; also sportsmen's clubs; and 12 labor organizations.)

Mr. BOUSTEAD. I would also like to call to the attention of the chairman the fact that we have available the names of a little better than 14,000 people who have contributed money in this endeavor, and we have here, which we do not care to submit for the record, petitions numbering signatures to the amount of 224 less than 30,000 people from the Arkansas Valley, asking that this project be endorsed. Would you like to see them, sir?

Mr. ASPINALL. You might leave them with the staff member so we can look at them.

Mr. BOUSTEAD. I believe that is all I have and I will pass to the other gentlemen.

Mr. ASPINALL. All right.

STATEMENT OF DAMIAN DUCY, PAST PRESIDENT, WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO, PUEBLO, COLO.

Mr. DUCY. Mr. Chairman, I am Damian Ducy, a realtor and resident of Pueblo, Colo., for over 50 years and have served as president of our Water Development Association of Southeastern Colorado for some 8 years, but still serve as member of the executive committee of our association. I present this statement on behalf of Frank Hoag, Jr., native Puebloan and publisher of Colorado's third largest newspaper, also a member of our executive committee, and myself. We have both worked closely together on civic affairs in Pueblo and the Arkansas Valley for the past 18 or more years, and are sure that we know the needs of our area.

It was our invitation to the Bureau of Reclamation in 1939 that began the first detailed studies looking toward the development of a feasible project for the transmountain diversion of water into the Arkansas Valley. We feel that the Fryingpan-Arkansas project meets the highest of standards and provides the best security practicable for the ultimate benefit of the people of the United States.

First of all I would like to thank you gentlemen for having arranged time from your busy days to grant us a hearing on the Fryingpan-Arkansas diversion project, which is so important to the future of our section of Colorado. We appreciate the courteous treatment afforded our witnesses to this moment.

REQUEST FOR A LOAN

We come before you to ask for a loan, and consequently place ourselves in the position of a borrower who has done business with a small bank which, due to its limited capital, cannot make large loans. We consider you the loan committee of a large bank and your duties as that of having to examine our application and report to the board of directors, which is Congress.

The Water Development Association of Southeastern Colorado was formed in 1943 by many citizens who realized that the Arkansas Valley had exhausted all of its resources to gain additional water through private capital.

The founders of our organization realized that our only chance for development was the construction of a multipurpose project such as the proposed Fryingpan-Arkansas. This project has been presented

to you from the physical, legal, agricultural, and power sides by previous witnesses. This project will not only allow for a small diversion of Colorado River water, less than 2 percent of Colorado's share, but will also serve as a means of flood control, sediment control, will allow falling water to produce hydroelectric power, and will also improve and create wildlife and recreation values. Further, it will enable us to better conserve our present very limited water supplies through the construction of dams which will allow storage of winter runoff, making full utilization of such waters possible.

WIDESPREAD SUPPORT

Approximately 15,000 contributors to our organization request through us, your consent to the loan which we desire. We have resolutions, statements, and so forth, which we would like to file for the record, backed by 250,000 people well prepared to offer evidence of these facts and to pledge themselves to repayment of more than 86 percent of the investment in the project.

Our resources are quite varied, which is important to a banker, for diversification of assets and energy assures a more stable loan. Our greatest source of income is from agriculture, including livestock raising. Our next greatest source of income is from industry, and the Colorado Fuel & Iron Corp., located in Pueblo, is the largest employer of labor in the State. This company is the ninth largest producer of steel in the United States. Next comes our tourist trade. Some of you, I know, have visited Colorado and are acquainted with the many attractions which we have to offer, as well as our delightful climate. Although Colorado is thought of as a mining State, this industry is fourth in importance as far as income is concerned.

Physically, Colorado is divided by the Continental Divide, but I am glad to state that an overwhelming majority of our people, totaling some 1,350,000, recognize no such barrier, for we have a fine saying in Colorado that "What is good for one part of the State is good for all."

BRING WATER TO THE LAND

Some very interesting studies have been made as to our natural resources, and there is one in particular which I would like to refer to for just a moment, made by Mr. Charles Patterson, an outstanding engineer, on behalf of the Colorado Water Conservation Board.

As a result of the various compacts relating to the Colorado River, Colorado has been granted the use of 51.75 percent of the upper basin allotment, which roughly figures about 3,800,000 acre-feet, and we are allowed to put this to beneficial use if we take the proper steps in time. We in Colorado use roughly 1,600,000 acre-feet, which means a surplus of better than 2 million acre-feet, before allowing for transportation losses, evaporation, and so forth.

We ask for diversion of only 70,000 acre-feet, which is less than 4 percent of the water allocated to Colorado which is not now being used, or less than 2 percent of Colorado's total share.

This Patterson study discloses that in Colorado various important characteristics were notable between the east and west slopes of the

Continental Divide, and I submit to you herewith the following figures:

	East slope	West slope
	Percent	*Percent*
Land area	54	37
Water resources	18	68
Irrigated land	49	26
Arable land, if water	90	5.4

The marked variances mentioned above are, of course, due principally to the topography of the western part of Colorado, for it is there that most of our high peaks are located.

GREAT VARIATIONS IN WATER SUPPLY

The average rainfall in Colorado varies from as low as 8 inches to as high as 50 inches annually with an overall State average of 16 inches. However, in Pueblo County the historic average is a trifle less than 12 inches annually. We have known a year with as little as 6 inches of moisture and it is said in 1894 there were but 2 inches. Currently we are passing through a drought circle because in 1954 we had only 7½ inches of moisture which is the worst record in 20 years, and in this year 1955 to May 1 we have had but 0.75 inch as against a normal of 3 inches. However, in contrast, and to emphasize the great variations in precipitation and river flow, our highest year of precipitation was a record 20.25 inches in 1921.

We have found that the average water supply passing through our irrigation systems varies greatly. Some of our better ditches can depend on some 3 to 5 acre-feet per year over a period of 200 days, while others can depend on 1 acre-foot, if lucky, and that for about 50 days.

LOAN SECURITY

The Arkansas Valley and its basin encompasses the bulk of 12 counties in southeastern Colorado. It extends from Leadville at the top of the divide, to Holly at approximately the Kansas State line. Also from Colorado Springs at the north to Trinidad on the south.

Pueblo is a community of approximately 95,000 persons and is the largest city in the area. Colorado Springs has grown rapidly to a city of 60,000 persons. The population of the Arkansas Valley in 1900 was 137,000 people; in 1950, there were 265,000 people and there are approximately 300,000 people today. The water supply is literally the same as 55 years ago.

The security which we offer you for this loan can best be stated by quoting the assessed valuations for tax purposes of our proposed conservancy district which is $354 million. The real value, however, would be at least $850 million for under our present law we are assessed at 40 percent of 1941 cash value.

SOUND ECONOMY

The agricultural pursuits in the valley are much the same as in other parts of Colorado with principal crops of alfalfa, sugar beets,

vine and vegetable crops, grains, and so forth. The raising of cattle, sheep, hogs, and a lot of turkeys provide further farm income.

We are rich in natural resources and excellent transportation facilities, and consequently have many fine industries. These industries could be enlarged and would be surrounded by many satellite plants if water and additional power were available. We enjoy a very fine strategic position insofar as the Government's industrial dispersion program is concerned, for we are nestled against the Rocky Mountains. Although we are not located exactly in the center of the country, we are afforded a natural defense barrier by our mountain ranges. The Civil Defense Administration has attested recently to the importance of our area in case of war.

The Colorado Fuel & Iron Corp., again Colorado's largest employer and the ninth largest producer of steel, is located in Pueblo and employs approximately 8,000 persons. The Pueblo Ordnance Depot employs about 4,500. This depot is located east of Pueblo and it is one of the largest depots in the country. It serves a 7-State supply area.

The Triplex Corp., a large producer of pistons, is also located in Pueblo. Timken Roller Bearing has a plant located in Colorado Springs. Fort Carson, a very large defense installation, is located in the same city. The Air Force Academy is the latest addition and the Air Defense Command of the United States has its main headquarters in Colorado Springs. We have the largest broom factory west of the Mississippi, and many canning factories, packing plants, lumbering and mining plants, 3 sugar refining plants, and 5 railroads—Colorado & Southern, Santa Fe, Denver & Rio Grande, Missouri-Pacific and Rock Island employing about 2,500.

We also have many fine institutions in our area dependent upon water and power, such as the Colorado State Hospital at Pueblo, housing 5,500 patients and employing approximately 1,800 people. Colorado Springs, Buena Vista, Canon City, and Fort Lyon are also the locations of several similar institutions.

Our cities vary in size from Pueblo with 95,000, Colorado Springs with 60,000, to La Junta and Lamar with approximately 10,000 folks, and a dozen or more smaller communities such as Rocky Ford, Salida, Canon City, Ordway, Las Animas, Florence, Leadville, Walsenburg, Eads, Holly, and so forth, with populations varying from 600 to 700 people, to 5,000. Many of the smaller communities suffer far more from the shortage of water than do Pueblo and Colorado Springs.

INADEQUATE MUNICIPAL SUPPLIES

These smaller communities depend upon very small diversions from the Arkansas River and upon wells pumped into such meager storage that should we have a power failure, or well-casing break, they would have a little over 3 days' supply of water.

You gentlemen know that a good economy should insure at least a 3 to 6 months' water supply. The same shortage has resulted in many of our communities not issuing building permits, restraining the planting of lawns and shrubbery, and other means to conserve what little water we have. We have many communities in the valley where inhabitants get water for household purposes by having it hauled in 1,000-gallon trucks, which costs $5 per tankload. At this

price the cost per acre-foot would be $1,630. This results in no bathrooms which, of course, means losing some of the nicer conveniences of life, and also exposes the people to unsatisfactory conditions. For the third consecutive year in our own community of Pueblo, restrictions as to the irrigation of lawns, shrubbery, and so forth, were placed in effect in March. With the same restrictions affecting everyday life, our people have suffered in the loss of many prospective industries coming into the Arkansas Valley.

FARMERS ARE WILLING AND ABLE TO PAY

Mr. Ryan, Mr. Cooper, and Mr. Marshall have presented to you the outlook of the typical farmer in our communities. We could have introduced many more practical farmers, but in respect to your time, we merged the various statements into the ones presented. Mr. Ryan has pointed out to you that our agricultural losses over the past many years can be safely stated as having been approximately 30 percent due to the lack of water, and our inability to place what water we have in the fields at the proper time. They speak officially for irrigation companies as well as farmers. Mr. Cooper's demonstration of his past year's experience certainly points up our agricultural needs.

We have done what we believe is an unusual thing in connection with the study of our project, in that our organization, with Roy Cooper as chairman of the committee, in conjunction with the bureau, has held meetings with 300 individual farmers and made case studies as to their needs and to the benefits which might be derived if supplemental water were available.

CROP INSURANCE

When a farmer's seed is in the ground and his plows have tilled the soil; when he has spent many hours weeding and cultivating; when his crop is coming along in great shape, he stands to lose, in a very short time, his year's work on that acreage due to little or no rainfall when the crops are ready to mature and be harvested. The supplemental water supply provided under this project is cheap crop insurance and the farmers of the Arkansas Valley have testified to that effect. An average cost of $5.40 an acre-foot is small change when a $50 or a $100 or a $200 per acre crop stands to be lost. That's one of the most important factors constituting the need for additional water in the Arkansas Valley. The farmers made that determination, not the engineers, or the Bureau of Reclamation, or the Colorado Water Conservation Board, or anyone else. They had their own meetings and determined that such a cost factor was more than good business; it was cheap crop insurance. These are the men who, during the past 50 years, have done everything within their power as individuals and through their ditch companies and associations to improve the water supply and delivery in the Arkansas Valley.

Private capital has done all it can do to increase the water supply in the Arkansas Valley, the latest being construction of the Twin Lakes diversion project.

John Beaty, formerly vice president of our organization, who died a few weeks ago, has made a very thorough study as to the benefits to be derived, and it was his conservative estimate that where our

annual income from agriculture is now $27 million, that with present prices the small amount of water which we ask would increase this annual income to $34 million, or roughly 25 percent.

Not only have farmers testified they are able and willing to pay $5.40 an acre-foot for supplemental water, but testimony has been presented by Mr. MacDonald representing our Arkansas Valley banks which supply most of the credit needs of the farmers to the effect that the cost of supplementary water is small compared to the opportunity to increase their income and prevent practically complete loss of their investment in their crops due to a shortage of water.

PARTNERSHIP APPROACH

In our presentation to the Congress we have given substance to the partnership approach in the development of the resources of our State.

We, as one of the partners, agree to buy the water furnished by the project, pay for storage of water which can be conserved, buy the power to be created, and in addition to levy a 1 mill tax on all property within the district for the life of our contract with you. You gentlemen will provide the investment capital which we need, with but 14 percent, approximately, being a direct charge to the general welfare of these United States which is the flood-control and wildlife benefits generally accepted over many decades as being for the general good of our country.

We feel that the proposed Fryingpan project is almost a perfect example of the partnership so desirable between Federal, State, and local interests.

We feel that should you grant us this loan, we can repay it, and feel that the studies which we have made, as well as those made by the Bureau, will substantiate this statement. This multipurpose project will not only provide supplemental water so badly needed by our cities, industries, and farmers, but through the construction of the dams referred to in the engineering report, many other things will be accomplished, as outlined in detail previously, including flood control, sediment control, storage, hydroelectric power, and aid in preservation of fish and wildlife.

Surplus waters of the Fryingpan River are to be diverted under this project and a dam will be built above Aspen, Colorado for protection of western Colorado. This dam will allow the Twin Lakes full diversion rights and still improve western Colorado's present position. Let it be remembered that the Colorado Water Conservation Board, the official agency of the State which has the legal and moral responsibility to protect the water rights of all Colorado, has approved, not only once, but three times, the Fryingpan-Arkansas diversion project as presented to Congress. In addition, you have the statement of Governor Ed. C. Johnson of Colorado, the newly elected chief executive of our State, who endorses completely and fully the Fryingpan project and requests its immediate authorization and construction.

With all of the care and preparation behind this project it seems too bad that the interests of a few persons, who stand to lose some of their land at the Aspen Reservoir site, have been magnified to a point where there has been deliberate distortion of the facts, and a

grotesque effort made to attract attention by paraphrasing Shakespeare when they call it "The rape of the Roaring Fork." Should they not call attention to the fact that the entire population of Pitkin County, including Aspen, where the Fryingpan diversion takes place and where the Aspen Reservoir is located, was less than 1,700 persons in 1950 which is even less than the population was in 1940. Aspen is located in a beautiful valley and it has a population of approximately 1,000 persons. The town of Aspen will not be disturbed physically by the project. Let us contrast this to the needs which have been testified to during this hearing of more than 250,000 persons who are residents of the proposed conservancy district which would obligate itself to pay the charges specified during these hearings.

We would like to submit to the committee copies of a study made for the Colorado Expenditures Council, a taxpayers' organization which has served as watchdog of Colorado tax affairs for more than 15 years. This organization is similar to about 40 others serving their respective States, and is affiliated with the taxpayers' council.

The study was made by Dr. E. T. Halaas, chairman of the division of finance and banking, University of Denver, for the Colorado Council "because he was considered to be eminently qualified in the fields of economics, finance, and research. His report reflects a high degree of objectivity in the determination and presentation of the facts, and merits careful reading," so states the council.

The report is an analysis of the objections made in the minority report of this committee submitted in July of 1954 to the authorization of the Fryingpan project. It also analyzes the project in light of changes which have been made in respect to certain financing aspects.

We think this is a very valuable contribution to a complete analysis of the project for Members of the Congress. We respectfully request that it be included in full in the printed record of these hearings for it has value and is submitted on behalf of the taxpayers of Colorado and the Nation in answer to critics of the Fryingpan project.

In our scores of trips to Washington over the past many years we have had scores of intelligent and provocative questions asked of us by Members of the Congress. We have tried through our many witnesses to answer these questions.

It is said that our proposal undercuts the Hoover Commission—to this we can only say that Congress will consider the Hoover report when submitted, may accept part, all or none of it. The action of the Congress on the Hoover report will become the law of the land and our project, like all others, will have its pattern changed to fit the wisdom of this body.

We have been asked why further agricultural development should be encouraged in light of present-day surpluses. Dr. Shaw of the Agricultural Department recently testified that agricultural surpluses in 1954 were less than 6 percent, would be less in 1955, and that at current rates we should be in balance by 1959. Further that loss of productive soils totals thousands of acres each year due to waterlogging, erosion, salting, and the like.

Population of our country is expected by many authorities to be somewhere between 190 and 205 million people by 1975 as against about 162 million today. It is stated that agricultural production need be increased by 40 percent by 1975 to feed these extra mouths and maintain our steadily rising standards.

Senator Anderson, former Secretary of Agriculture and War Food Administrator recently stated that 35 million acres of new farmland would be needed by 1962 (we ask no new land) for meat production alone and that during the next 10 to 20 years we will lose nearly 1½ million acres of present productive land through natural causes plus appropriation for airports, highways, and our expanding cities. He estimates that our present population is 162 million and increasing at the rate of almost 3 million per year.

Just these few quotes leave us with absolutely no fear of agricultural overproduction.

It is charged that a huge concealed subsidy is hidden in the Fryingpan project. We deny that and have not the merest apology for the fact that about 14 percent of the proposed cost is nonreimbursable, and is charged to flood-control and wildlife benefits. Such a policy has been established for years and we consider it for the general good of all the people. The cost of such benefits has reached staggering totals in many of our States.

Reclamation law for the past 53 years has recognized the overall benefit to our Nation derived from investing interest-free money in reclamation projects in our Western States. We deny hidden subsidy in carrying out this policy. Mr. Tomlinson, USBR, has testified that by the wildest stretch of the imagination it can only be said that Federal assistance amounts to 33 million—as against the 500 million fantastic figure charged by the critics of the Fryingpan.

We just ask that our critics in fairness compound the benefits to be derived from the Fryingpan by the same factor which they delight in using when they may make unfair charges of taxpayer cost against us.

Too, remember that we obligate ourselves to pay interest in the total of more than $49 millions plus repaying the loan which we request that you approve.

We have tried to present our testimony in as brief a form as possible, recognizing the importance of your time. We hope we have painted a picture for you which will indicate the dire need for the project. We know that some of you have visited our State and the Arkansas Valley so that you can picture the situation which we have attempted to set forth.

We have attempted to tell you that we feel we have exhausted all private resources for future development, that we have the security necessary for the loan which we request, that we believe the resources which can be developed through the Fryingpan-Arkansas project will produce income enough to make repayment of the loan possible, for we want no charity. We know that in granting this loan you will enable us to create values which will be taxable by our local governments and create an additional income which will mean income-tax revenues in excess of those presently received by the Federal Government. We would also become much better customers of the 47 other States in the Union than we are today, through the creation of additional wealth and income. We also feel that in this day and age of the atomic bomb, national-defense requirements warrant serious consideration of the development of this part of the country which is literally the best fortress which our Government has.

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Industry has grown, transportation has grown, cities and towns have grown, until today we not only have the problem of supplementing the natural flow of the river, but we must meet the demands of a progressive and live region. The shortage is now twofold. We are not only short of water for irrigation, but water for domestic and industrial purposes in our municipalities. That is double security for multiple-purpose usage.

We have nothing to hide. We have negotiated, conferred, and studied with all the cards on the top of the table. We hold no jokers or wild cards. We only request your assistance to satisfy those normal human desires to build something better, something bigger as part of our contribution to a growing America.

Thank you.

Mr. ASPINALL. The next witness will proceed.

STATEMENT OF HAROLD H. CHRISTY, DIRECTOR, WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO

Mr. CHRISTY. For purposes of identification, I am Harold H. Christy, Pueblo, Colo. I am a registered professional engineer in the State of Colorado. Since 1929 I have been employed by the Colorado Fuel & Iron Corp. at Pueblo as chief engineer of the water department and for the past 7 years as superintendent of the power and water departments.

I have been a member of the executive committee of the Arkansas Valley Ditch Association since 1930 and a director of the Water Development Association of Southeastern Colorado since this association was organized. I was a member of the policy and review committee which was set up to investigate and make recommendations to the Colorado Water Conservation Board on the Fryingpan-Arkansas project and also a member of the subcommittee which drafted the operating principles referred to in Colorado's official comments and in the project report by the regional director of the United States Bureau of Reclamation. I was also a member of the conference committee established by the Colorado Water Conservation Board to determine the water supply in the Colorado River and to recommend policy for future planning.

ARKANSAS RIVER BASIN

The Arkansas River in Colorado is formed by the East and Tennessee Forks which unite at Malta, near Leadville. The elevation of the headwaters area ranges from approximately 9,400 feet at Malta to 14,400 feet on the highest mountain peaks. The river flows in a southeasterly direction for a distance of approximately 110 miles, through narrow mountain valleys and steep rocky canyons, to the mouth of the Royal Gorge, immediately west of Canon City (elevation 5,800 feet), thence continues across the plains to the Colorado-Kansas line (elevation 3,300 feet), some 340 miles from its source.

The Arkansas River Basin in Colorado comprises more than 25 percent of the total area of Colorado; however, the distribution of precipitation is such that the basin contains only about 7 percent of the State's water resources.

Settlement and development of the basin actually got underway in the late 1850's. Permanent settlement continued as new ore deposits were discovered in the headwaters area, west of Canon City. Irrigated agricultural development occurred almost simultaneously in the areas closest to the mining areas in order to provide food and fiber. Attached to this statement is a line drawing, showing gaging stations, reservoirs, and ditches within the project area.

DEVELOPMENT AND UTILIZATION OF WATER RESOURCES

The early development of irrigated agriculture was by numerous small ditches along the tributaries and the main stem of the Arkansas River. Subsequently these small ditches were consolidated into major developments, the first of which occurred in the early 1870's and continued through the 1880's. These early priorities represent the dependable water rights in the consolidated systems, as compared with the priorities established under these systems by reason of their construction.

The erratic flow of the river resulted in a deficiency in the water supplied by the direct flow rights. This caused the construction of numerous reservoirs for the storage of runoff from winter snows and torrential summer rains. This period of development occurred during the late 80's through 1910.

During the period 1860 to 1910 the irrigated acreage increased from practically nothing to a peak of 550,000 acres and continued at approximately this amount until the late 1920's. The acreage under irrigation has been on the decrease since this time, primarily due to an inadequate water supply. The average during the last decade approximated 460,000 acres which represents a reduction in the irrigated acreage on the order of 80,000 acres. These figures are for the drainage basin.

Comprehensive investigations definitely indicate that all development of water resources possible under private financing has been accomplished. In fact, overdevelopment occurred as a ditch and reservoir on the Apishapa River was washed out by a flood in 1923 and was never rebuilt. Stating this in another way, let's say that all single-purpose project development has been accomplished. This statement is justified when it is realized that the annual runoff from October to October of each year varies from a low of 195,000 acre-feet to a high of 933,000 acre-feet at the Pueblo gauge. The mean annual runoff for the period 1910 through 1944 at the Pueblo gage is on the order of 513,000 acre-feet.

I am sure that a main stem reservoir, of large capacity, is required to iron out the fluctuations of stream flow. In this area there are few good reservoir sites and in most cases the good sites are transversed by railroads and highways. This results in high construction costs and makes it mandatory that construction be by means of multipurpose projects, providing benefits for irrigation, municipal supply, sedimentation, and flood control on the few sites which are available. Projects of this type, due to the varied interests involved, are impossible of accomplishment under private financing.

The only increase in water supply, since the first decade of 1900, has been the construction of some 6 small transmountain ditches, with production ranging from 900 to 7,000 acre-feet annually. The total

increase in water supply resulting from these transmountain ditches is on the order of 10,000 to 12,000 acre-feet annually.

The first transmountain project of any size on the Arkansas River was constructed by the Twin Lakes Reservoir & Canal Co.—a mutual ditch company owned by the farmers—known as the Independence Pass Transmountain Diversion. This project was placed in operation in 1935 and since that time has contributed an average of about 38,000 acre-feet annually, the peak diversion being on the order of 48,000 acre-feet.

All of these transmountain diversion projects have been awarded decrees for the water rights permitting the diversions. I wish particularly to call your attention to the fact that the Twin Lakes Reservoir & Canal Co. owns decreed water rights on the Roaring Fork River which, with proper storage facilities available on the Arkansas River drainage, can divert approximately 52,000 acre-feet annually. This mutual ditch company, due to its financial condition, was not able to provide the extra storage at the time the Independence Pass Diversion was constructed. However, the company has been building up a fund to be used for increasing its own storage facilities.

With the possibility of the Fryingpan-Arkansas project, with its valleywide benefits, this company has deferred its own construction pending the outcome of requests for the authorization of the Fryingpan-Arkansas project. The project plan calls for the enlargement of Twin Lakes Reservoir and, if the project is authorized, the company has elected to rent space for storage of rights presently owned rather than construct its own facilities. In other words, the full development of the diversion under the Independence Pass Transmountain Diversion project will become a reality, regardless of whether the Fryingpan-Arkansas project is authorized.

There already exists a burden on the Roaring Fork River, resulting from the Independence Pass Diversion, which has no relationship whatever to the Fryingpan-Arkansas project, with the exception of the benefits to the Aspen area by reason of the project plan. I emphasize the stipulations of the operating principles, agreed to between eastern and western Colorado, wherein the owners of the Independence Pass Diversion have agreed to defer diversions during certain periods of the year in exchange for water delivered from the Fryingpan-Arkansas project in order to firm up and make possible the stream flows recommended by the State and Federal fish-and-game authorities in this area.

The outlined transmountain development has exhausted all possibilities available to the Arkansas River Basin which can be financed as a single-purpose project, forcing the consideration of a multipurpose project for the firming up of the irrigation, municipal, and industrial water supplies.

There has been no federally financed development in the Arkansas River Basin in Colorado, with the exception of the John Martin Reservoir project on the lower river which was constructed by the Army engineers and placed in operation in the early 1940's as a flood control and conservation project. The John Martin Reservoir has a capacity of approximately 685,000 acre-feet, of which some 400,000 acre-feet are for conservation purposes and 285,000 acre-feet for flood control. Under the interstate compact water in the conservation pool is divided between the States of Colorado and Kansas.

There are some who feel that there is a surplus of native Arkansas River water going unused in Colorado. A study of the stipulations of the Colorado-Kansas compact will explode this theory. In planning the Fryingpan-Arkansas project the flood flows to be regulated are only those which would normally spill from the John Martin Reservoir. The conservation of flood flows is further proof that the Fryingpan-Arkansas project, as planned, will utilize all available native Arkansas River flow, with the possible exception of some flash run-off which originates between the John Martin Reservoir and the Colorado-Kansas line.

PROJECT INVESTIGATIONS

Following a severe drought in the early 1930's, the water users in the Arkansas Valley were able to prevail upon the United States Bureau of Reclamation to initiate investigations in the valley to determine the need for additional water supply. Also, to investigate possible sources of supplemental supply available to the valley from the Colorado River drainage. Of necessity, the work of the Bureau covered not only the water supply but also the future needs in western Colorado in order to develop the amount of surplus water available for use in eastern Colorado. These investigations in the first instance were in the nature of an inventory of the ultimate potentials. The results of these investigations supplied important information for Colorado's presentation as to its rightful needs in the deliberations leading to the upper Colorado River Basin compact, signed on October 11, 1948. Following the signing of this compact, which divided the waters of the Colorado River allotted to the upper basin States, the water users in the Arkansas Valley were in a position to go ahead with a definite plan. The urgent need for supplemental water supply for irrigation and domestic purposes justified the development of a small diversion project from the tributaries of the Roaring Fork which, coupled with good husbandry of the native waters of the Arkansas River, would be economically feasible.

Accordingly, at the request of the water users, the Bureau of Reclamation undertook the development of a plan for a project. In developing this plan not only the water users but also the Colorado Water Conservation Board were consulted in order to insure that the plan developed would meet all official requirements, as set forth by the Colorado Water Conservation Board. Subsequently the Fryingpan-Arkansas project report was submitted to the Colorado Water Conservation Board for its formal approval, at which time the board elected to set up a policy and review committee, consisting of representatives from eastern and western Colorado, to study the plan and make recommendations to the board. The studies covered water supply and future uses in western Colorado. The activities of this policy and review committee will be covered fully by Mr. Charles Beise. At this time it is sufficient to state that this policy and review committee set up engineering and legal committees upon which both sections of the State had representation to advise them in their deliberations.

DOMESTIC SUPPLY

During the period of agricultural development the human and livestock requirements for water in the valley were constantly increasing. Population of the towns and cities increased from the "trading post" size to thriving communities. Municipal and domestic requirements have played an important part in the reduction of water available for agriculture, particularly in the vicinity of Pueblo and Colorado Springs. These communities had a population in the metropolitan areas in 1950 approximating 90,000 and 60,000, respectively.

Growth of Colorado Springs led to their acquiring ditch rights along the Fountain River, between Colorado Springs and Pueblo and the transfer of these rights to their headwaters reservoirs on the slopes of Pikes Peak. This resulted in reduced irrigation agriculture along the Fountain River, as evidenced by statistical record showing some 20,967 acres irrigated in 1929, as compared to 14,400 acres in 1949.

Actually, no further transfer of rights along the Fountain can be beneficially accomplished as the natural flow at the Colorado Springs points of diversion is now fully depleted. The remaining agriculture in the area is being supplied by return flow from the city, some underflow and small flow from the lower tributaries.

The needs for the city of Pueblo have also been supplied by the acquisition of irrigation rights. Several attempts for transfer of additional rights have failed in the courts.

The records will indicate numerous occasions when the river has ceased flowing at the South Side Dam at Pueblo. This dam is a part of the diversion works at the Pueblo south side waterworks and also is the location of the official Pueblo gage on the river. During the year 1934 the river flow was reduced for a prolonged period necessitating the sinking of wells in the river bed to obtain sufficient water to meet restricted municipal requirements. This water, of course, did not legally belong to the city and its quality was questionable. Continued municipal growth during the last war resulted in the city's being threatened with legal action by the lower river ditch owners on account of overdiversion of the city's rights.

The above clearly indicates that Pueblo, as well as Colorado Springs, has depleted all of the available Arkansas River supply without condemnation proceedings of irrigation rights which would, of course, result in further reduction of agriculture production in the valley. These domestic requirements must be supplied from a source other than the Arkansas River. The tributary streams of the Colorado River represent the only remaining source of supply available to the Arkansas River Basin.

Since the available supplies from the Colorado River drainage occur during high spring snow runoff, the major part of the diversions will of necessity have to be made during short periods which will require large storage reservoirs in the Arkansas drainage basin. Thus, domestic requirements for the future are definitely tied in with a multipurpose project in order to provide orderly development.

In planning a project of this nature the human and animal requirements in the urban and rural areas must be considered. It is anticipated that numerous delivery points will be provided along the valley pipeline (a feature of the project) for service to urban and

rural population. Drinking water throughout the entire valley area is of questionable quality and is presently hauled from the towns to the farm sites for human, as well as livestock consumption.

Most of the towns east of Pueblo have depended on well supply. However, during recent years some have been forced to sink wells in the river flood plain, or divert and chemically treat ditch water, the ditch water being of much better quality, insofar as hardness is concerned, than the well water mentioned. Well supplies are not dependable in the Arkansas Valley as to quality, continuous flow and volume.

More detailed information with reference to municipal supplies will be presented to you by witnesses representing the municipalities of Colorado Springs, Pueblo and the Arkansas Valley towns.

PUEBLO RESERVOIR

This project reservoir, located some 6 miles west and upstream from Pueblo, constitutes a typical multipurpose unit of the Fryingpan-Arkansas project. Municipal development of this site as a single-purpose project could well result in detriment to future overall plans for basin benefits, as only limited reservoir sites are available. Combined use of a site of this type results in lower unit cost and the pooling of storage interests at the site will result in lower surface evaporation losses, thus conserving the limited water supply available.

Following the flood of 1921, at which time approximately 100 lives were lost and property damage of approximately $19 million occurred, the city of Pueblo formed a conservancy district. Under the auspices of this district a flood channel through the city and a barrier dam were constructed at a total cost of from $9 million to $10 million to the local taxpayers. Again we find evidence of local interests having provided for their own protection without Government participation.

This conservancy district work provides a channel through the city with a carrying capacity of approximately 120,000 cubic feet per second. However, due to the conditions of the channel below town, competent engineers feel that a flow of approximately 60,000 cubic feet per second would inundate the present waterworks facilities, leaving the community of approximately 90,000 people without water for domestic consumption or fire protection.

Construction of the Pueblo Reservoir will control the flow through the flood channel to an estimated maximum of 25,000 to 30,000 cubic feet per second, this peak flow being the result of flash runoff on drainages tributary to the river between the reservoir and the waterworks systems.

The reservoir will provide space for storage of winter flow not being efficiently utilized at this time, permitting the application of this water on crops during the growing season; also, space for storage by agreement among the water users of water normally held in the lower plains reservoirs on which excess evaporation occurs. Any reduction in the evaporation naturally increases water for application directly to the crops or for municipal use. This storage of the winter flows and the exchange of storage from the plains reservoirs must be accomplished under the Colorado statutes by agreement among the water users. All of the larger ditch companies in the lower valley have

signified their willingness and intention to work out such an agreement. Service charges on this type operation of the Pueblo Reservoirs will provide the contracting agency with some additional funds for repayment to the Federal Treasury for construction of the project and guarantees additional security for the investment.

In addition to the above uses of the Pueblo Reservcir, material benefits will be obtained in connection with sediment control, electric power, and storage space for reserve domestic supply.

Federal regulations relative to uniform quality, in connection with water supplied for use in Interstate Commerce, will, no doubt, force the addition of sedimentation facilities. Large expenditures of funds for these facilities, independent of some overall plan for the valley, would be false economy. A manufacturing and transportation center along the front range of the Rocky Mountains, together with the agricultural production, including the local trade centers, certainly should warrant full consideration and opportunity to participate in the reclamation and flood-control program of the Nation.

The importance of this area, in case of war, should be given serious consideration, due to its geographic location and Sugar Loaf Reservoir site and land around this reservoir may be utilized so long as the vested rights of the corporation are not diminished or interfered with. You will note that storage space, over and above the existing decree, is to be paid for in the same manner as other reservoir sites used by the project.

The steel plant system is further mentioned as a typical example of requirements for industrial water as expansion occurs in the area. For example, in 1929 plant requirements were 32 million gallons per day, as compared to present requirements of some 60 million gallons per day, together with additional water reclaimed and recirculated to carry on the operation.

This plant produces many items required by the defense effort, including shell steel, barbed wire, miscellaneous structural shapes, rails and fastenings and, since the completion of the tube mill, gun casings, as well as seamless tubes. Recent and planned expansion with new products will tend to draw allied industries to the area. These industries will require water for their use and their employees. This, along with the corporation's use, will increase the demand for domestic water.

During recent years Pueblo and the Arkansas Valley have failed to obtain numerous industrial plants on account of lack of water. For example, a paper mill requiring some 80,000 to 90,000 gallons of water per ton of production and a coal washery plant requiring some 200 gallons per ton of coal handled. Fall campaigns of existing sugar plants have experienced water shortages during the last decade, particularly during drought years. Feldspar, fluorspar, lead, zinc, manganese, ceramic materials, etc., are available in the Arkansas Basin in Colorado, all awaiting economic development as population increases and the markets build up. Development of these raw materials necessitates an increased water supply in order to provide for domestic consumption, as well as processing. Without the Fryingpan-Arkansas project no water is available without further depletion of the agricultural supply which is already far below the normal requirements.

POWER MARKET

Raw materials known to be available in the project area present a ready market for low-cost power. Many of the coal and metal mines have been flooded out. Low-cost power, particularly secondary power, could be consumed in unwatering these mines, thus restoring the economy of these areas.

The Arkansas Valley presently is not tied in with any large electrical grid system, whereby interchange or large blocks of standby power are available. This condition has made it necessary for each local system to provide capacity in excess of that required in an area where interchanges permit the pooling of surplus capacity to provide for emergency standby. This condition has been responsible for the lack of installation of metallurgical furnaces and allied industries.

WESTERN SLOPE BENEFITS

The Fryingpan-Arkansas project consists of a high altitude collecting system, designated to divert surplus snow runoff to eastern Colorado without injury to western Colorado.

Streamflow records indicate that 90 percent of the divertible water is available during the months of May, June, and July. The records also indicate that the residual flows in the streams in western Colorado, during this same period, are approximately the same as the diversions.

Future irrigation potentials in the project area in western Colorado are limited. Low flows during April, August, and September control development without the assistance of storage facilities. This definitely indicates that the divertible flows available to the Arkansas Valley are not presently being put to beneficial use in western Colorado. The residual flows during peak runoff are adequate for future irrigation development in the immediate area, with a surplus remaining for industrial development.

Western Colorado will be benefited during the late growing season by releases of water from the Aspen Reservoir. The policy and review committee designated this site, as the replacement reservoir, at the request of the water users in western Colorado. The replacement reservoir under the Colorado Big-Thompson project made a major contribution during 1954 to the irrigated acreage on the main stem of the Colorado River. Had the Aspen Reservoir been available during 1954, it too would have made a sizable contribution to the economy in western Colorado.

In addition to the above, recreational facilities will be increased in western Colorado, as evidenced by the exchange agreements included in the operating principles relative to firming up stream flows to maintain fishlife, as recommended by the fish and game authorities.

GENERAL

The Fryingpan-Arkansas project, as presented to you, is a multipurpose reclamation project, designed to provide irrigation and domestic water, electric power, and flood control in that portion of the Arkansas Valley in the State of Colorado.

The project will provide a supplemental water supply on the order of 183,000 acre-feet annually, made up of 70,000 acre-feet of new water from western Colorado, together with the re-regulation and storage of existing native waters of the Arkansas River. The high altitude collecting system in western Colorado is designed to intercept the natural water courses and convey the water in covered or tunnel sections, thus preventing the interruption of flow due to ice and snow conditions. Powerplants are provided to use both the imported water and the native waters of the Arkansas River, via power canals at an elevation of 8,000 feet. Continued cold weather will permit freezing over and a continuity of flow under the ice. There are those who say you cannot run a ditch in the winter time in this area; however, we have been doing it in the Colorado Fuel & Iron Corp.'s water system for many years.

The project, as planned, is well within Colorado's allotment under the upper Colorado River Basin compact. As a matter of fact, the 70,000 acre-foot diversion from western Colorado represents less than 1.8 percent of Colorado's share on the long-term average flow record and is only 2.25 percent of the average amount suggested by the Hill report as being available to Colorado during recent drought periods. It seems apparent that the diversion of this small amount of water from the basin cannot materially affect the quality of water delivered to the lower basin States. In fact, as I recall, witnesses from one of the lower basin States so testified at the hearings held before the 1st and 2d sessions of the 83d Congress.

I will not attempt to go into detail as to Colorado's use of its allotment of Colorado River water, as same will be covered by other witnesses, other than to state that the allotment by the Colorado Water Conservation Board to the Fryingpan-Arkansas project was made after complete investigations and it was the opinion of the experts that same could be accomplished without injury to western Colorado's future. Further, the official records, after all of the in- and out-basin uses had been realized in the upper basin, indicate residual flows at Lee Ferry of approximately 12 million acre-feet annually over the last 20 years, leaving approximately 2 million acre-feet annually of Colorado's allotment available for future use. The average flows during this period are considerably below the long-term averages on the stream.

The policy and review committee, when making its report, gave full consideration to the industrial requirements for oil-shale development in western Colorado and allotted 300,000 acre-feet annually for this purpose. We had before us statements from the United States Bureau of Mines indicating the water requirements for both wet and dry processes presently developed. Based upon these figures provision was made for development in this industry on the order of a million barrels of oil per day, together with allied and domestic requirements. In fact, if all of the development were accomplished by dry process the water allotted would support a capacity on the order of 2 million barrels of oil per day.

Frankly, being a taxpayer in Western Colorado and an owner of undeveloped coal land, nothing would please me more than to see a major development. However, we must be realistic. In my work on the conference committee and on the natural resources committee of

the Chamber of Commerce of the United States I have reviewed information reflecting the perplexing problems in the fuel industry in America which would not indicate any immediate development of magnitude in synthetic fuels. For example, there is presently high unemployment in the coal industry, with coal reserves in many of the States near centers of high population. The record also indicates that some two million barrels per day of petroleum reserves are now shut in by reason of proration laws and the impact of importation of residual oils.

In my work with an oil refinery in Oklahoma I noted large quantities of water produced as a byproduct. No accounting for moisture contained in the natural oil shale has been given. Due to the large quantity of rock required for one million barrels per day of oil production, it is possible that the river might actually gain from this industry. Consumptive use, or depletion of river flow is the quantity of water we must consider in planning for the future. The availability of water for diversions in the industrial area is assured on account of the river flow which is required through this reach of the river to supply decreed rights in the Grand Junction area. It is to be noted that Mr. Hill, in his report to the conference committee, confirmed the policy and review committee's estimate of 300,000 acre-feet as sufficient for industrial use.

Based on the above, I am confident that adequate provision was made for industrial development in Western Colorado.

SUMMARY

The Fryingpan-Arkansas project will alleviate a desperate need for supplemental water for irrigation, industrial and municipal use in the Arkansas Valley in Colorado.

Full use has been made of existing water supply. The river flow passing through Pueblo cannot be taken for municipal use as this water belongs to vested rights downstream in Colorado and Kansas.

Colorado River water to be diverted by the project is well within Colorado's allotment under interstate compacts and its use in Colorado is assured. The line drawing attached to this statement will indicate existing ditches and reservoir systems along the Arkansas River for the diversion and reuse of project water. This exhibit should convince anyone that Colorado River water will never get to Kansas. I also wish to call your attention to the official comments of Kansas, wherein they recognize that they have no right to Colorado River water.

If you will turn your attention to the left end of the line drawing you will note location of gauging stations on the Roaring Fork and Fryingpan Rivers at Aspen, Norrie, and Glenwood Springs. Part of the long-time records at these stations had to be correlated with other river stations. However, station readings since 1947, during a low runoff period of record, indicate slightly better flows than those used as a basis for the project report.

The Fryingpan-Arkansas project is a complete project and its authorization does not constitute a start on the large Gunnison-Arkansas project. Admittedly it will fit into any plan for full development of the Arkansas Basin in Colorado. In addition, Colorado's official approval is limited to the Fryingpan-Arkansas project, as is the bill for authorization before this Congress.

The Arkansas Valley in Colorado is a part of the Colorado River Basin by terms of the Colorado River compact, which is the law of the river. The Colorado Constitution stipulates that the water belongs to the people and does not make any distinction as to the use in any river basin. It has been stated for the record on this project that God meant for the Colorado River water to stay in its drainage. If this theory is accepted, southern California would be deprived of most of its water from the Colorado River. Further, flood control work throughout the United States, which restrains the natural flow of our rivers, would also be in violation of this precept.

Geographically Colorado straddles the Continental Divide, on the headwaters of five major river systems, all of which are covered by interstate compacts. We have gone along on the development of earlier civilizations on the lower reaches of these rivers on the assumption that the other States and the United States Congress would ultimately permit the development of our allotment of water when needed. If reclamation and flood control laws provide a subsidy now, they have always provided a subsidy. Most certainly the lower basin developments, beginning in 1928 with the Boulder Canyon Project Act, provided means for the beneficial use of water allotted under the Colorado River compact. A change in the rules now would deprive us of similar opportunity. Project construction in the lower basin, under these laws, is being used to establish beneficial use in excess of allotments under interstate compacts. America was not built by the repudiation of contracts and agreements. Hoover Dam, under the Boulder Canyon Project Act, would not have been constructed had Colorado refused to sign the contract. Now an area which admittedly has sufficient water under the Colorado River compact to double its population and increase its irrigational use protests the authorization of the Fryingpan-Arkansas project. The same area in Southern California is guilty of wasting water, as evidenced by the continued rise in the level of the Salton Sea. Millions of acre-feet of native waters arising in California are going to the Pacific unused annually. Protests from this area in California are contrary to the official comments of this fine State.

Comprehensive studies by the Policy and Review Committee of Colorado, the United States Bureau of Reclamation and the Colorado Water Conservation Board prove this project to be sound and economically feasible. At the hearings on the Fryingpan-Arkansas project on June 15–16, 1953, 1st session 83d Congress, Mr. R. J. Tipton, a consulting engineer of international stature and consultant for the Colorado Water Conservation Board, testified. I wish specifically to call your attention to his comments, with reference to engineering costs and estimates on the Fryingpan-Arkansas project, pages 216 and 217 of Senate hearings:

> Mr. TIPTON. With respect to the estimated cost of the project I have had my office review in detail the unit prices used by the Bureau of Reclamation in estimating the cost of construction of the Fryingpan-Arkansas transmountain diversion project. In general, it is our conclusion that the unit prices are adequate based on present-day construction costs.
>
> I would like to read into the record the memorandum prepared for me by two of my staff who are quite competent in estimating the cost of projects. It is very short. It is a summary of their findings:
>
> "The total estimated cost appears to be adequate. While there are single features that have definitely low-unit prices and others that have definitely high unit costs, they appear to balance each other.

"In making the examination, no account was taken of the contingency items, which vary from 20 to 25 percent. This amount for contingencies appears to be ample and should provide for any normal price increases over the period set for construction.

"On each individual estimate sheet has been indicated our opinion of each unit price. Due to the lack of sufficient information, no check was made on the cost of electric power distribution features.

"Attached are shown, for comparative purposes, bids on projects involving some large features similar to those of the project. No examinatin was made of administration and engineering costs. Submitted by Robert T. Crabtree and J. H. Sanford, June 5, 1953."

I was chairman of the engineering advisory committee that followed the evolution of this project very carefully, and in view of what had happened on the Colorado-Big Thompson project, we were at all times looking over the shoulders of the Bureau.

I myself feel that the quantities are generally adequate. We did find some features that we considered overestimated, such as the water treatment plant for municipal purposes.

In view of Mr. Tipton's testimony, it seems logical to assume that the present estimates, based on engineering cost indexes of October, 1954, together with slight modification of the plan for municipal supply, accurately indicate project costs.

Mr. Tipton also testified at the House hearings on H. R. 236, June 8, 9 and 10, 1953. I am sure the inclusion of Mr. Tipton's testimony would add to the record of this hearing. Mr. Chairman, I request that you authorize the lifting and inclusion in the record of this hearing the testimony of R. J. Tipton, on pages 115 through 127 of the record of the 1953 hearings.

Gentlemen, I urge that your committee give the Fryingpan-Arkansas project and the needs of the people in the Arkansas Valley your full and favorable consideration.

Mr. ASPINALL. You may proceed, Mr. Beise.

STATEMENT OF CHARLES J. BEISE, COUNSEL, WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO, DENVER, COLO.

Mr. BEISE. My name is Charles J. Beise. I am a lawyer with offices at 930 First National Bank Building, Denver, Colo., a partner in the firm of Fairfield & Woods. I have served as counsel for the Water Development Association of Southeastern Colorado, proponents of the Fryingpan project, for approximately 9 years. Prior thereto, I was counsel for the Vallecito project and the Mancos project, two reclamation projects in southwestern Colorado.

AUTHORIZATION LEGISLATION

There are several provisions in the bill now before you which should be mentioned.

Section 1 authorizes the Fryingpan project in substantial accordance with the engineering plans set forth in Senate Document 106 of the 82d Congress, 2d session.

Section 2 (a) provides for a type 9–D repayment contract under the Reclamation Project Act of 1939, but gives to that type of contract additional flexibility in that the annual payments can be varied to reflect not only economic factors affecting the ability of the organization to pay for water supply, but also water requirement conditions.

It permits repayment over a period of not more than 70 years, including any period of development.

The Fryingpan project does not furnish a full water supply for lands presently irrigated and there will always be a greater demand than supply of water. In some years, irrigators will not call on project storage. If a water user did not call for his water he would not have to pay for the same, and his water would be held in storage at high elevation, cumulated with the supply of other years, and released on demand. The water users did not desire a type 9–E contract under the 1939 Project Act. The repayment provisions of the reclamation law are inflexible. Accordingly, the legislation authorizing the project should be sufficiently flexible to meet the needs of a project which will only furnish a partial water supply for existing irrigated land. Section 2 (a) makes this possible.

Section 2 (b) provides for a repayment formula, whereby the costs of power, municipal, domestic, and industrial use features of the project are first repaid in full with interest, and the proceeds from power sales are thereafter applied to amortization of the costs allocable to irrigation but beyond the ability of the irrigator to repay. This requires a repayment period in excess of 50 years. There is no valid reason why the repayment obligation on irrigation features should be restricted to a 50-year interval when the life of the facilities constructed exceeds this many times. The period of repayment on reclamation projects has been extended from an initial 10-year period to a 50-year period. The reason is obvious. The simplest projects were first constructed. More complex projects remain which will cost more. By the same token, the type of construction involved is of such a character that its life is longer. The Government has triple security for its obligation after the 50-year period, for, if necessary, it can have the net revenues from power and municipal water as well as the direct revenue from irrigation, whereas, during the initial 50-year period, the security for irrigation payments is direct payment by irrigation users and the 1-mill levy of the district.

The Wilson Dam on the Tennessee River, Grand Coulee, and Hoover Dams are all now from 20 to 30 years old. These three great installations have hardly reached the beginning of their useful life. It would have been very foolish on the face of it had they been designed for a 50-year life. We have not asked that the repayment period be extended to the useful life of the project, but a 70-year period is a substantial discount of the estimated useful life of the project and the Federal Government is amply protected for the repayment of its investment.

Section 2 (c) relates to municipal water supply systems. Since the report on this project was completed, as contained in Senate Document 106, 82d Congress, 2d session, the city of Pueblo has at its own expense constructed a settling and treatment plant. This has been so designed that with the consent of the city of Pueblo this facility can be used by the towns located below Pueblo on the Arkansas River, which would be served by the valley pipeline. Accordingly, the cost of a settling and treatment plant will not be involved in the project. Colorado Springs has changed its plans from an exchange to construction of a pipeline from the Arkansas River to the city's water system. Section 2 (c) requires that the communities involved submit

evidence satisfactory to the Secretary of Interior, establishing that it is infeasible for them to construct the city water lines, singly or jointly. Only after such a determination has been made can the Secretary advance the cost thereof, and then only after he has obtained a contract providing for the repayment thereof.

Section 2 (d) exempts the project from the limitations of the 160-acre provision of Federal reclamation laws, provided that such lands have an irrigation supply from sources other than a Federal reclamation project. The project does not involve or contemplate the irrigation of any new land and only supplies approximately 50 percent of existing shortages. The economic unit of 160 acres established by the reclamation law is not a feasible unit for the Arkansas Valley. The proposed exception is not new. The Truckee storage project of Nevada and the Colorado Big-Thompson project of Colorado have each been totally exempted from any of the provisions of this act. The Conejos unit of the San Luis project permits a user to obtain a water supply for 480 acres. Other witnesses will testify regarding this provision.

Section 3 requires the operation of the project in accordance with the operating principles set forth at pages 20 to 23, both inclusive, of Senate Document 106, which comprise the compact between the western slope and the eastern slope of Colorado and govern the minute details of project operation. I will discuss the operating principles later in my presentation.

Section 4 refers to Senate Document 80 of the 75th Congress, 1st session, and Green Mountain Reservoir on the Colorado Big-Thompson project. The committee will recall that the Colorado Big-Thompson project contained as one of its essential features a replacement reservoir for the benefit of western Colorado water users known as Green Mountain Reservoir, located on the Blue River above the town of Kremmling, Colo. Because of contentions as to the interpretation of that document, it was felt that if the bill authorizing the Fryingpan project made no reference to Senate Document 80, it could be argued indirectly that Congress had subsequently adopted the point of view of one side or the other as to its interpretation. Accordingly, to prevent such possible contention, section 4 of the bill was inserted.

Section 5 was inserted because of the municipal requirements of Colorado Springs, Pueblo, and other valley towns. The municipal requirements of these cities were recognized by our friends in western Colorado as paramount uses. It was realized that these cities had to ultimately obtain water from western Colorado. These western slope interests desired to have language inserted in the operating principles to the effect that such domestic uses would be preferred over all others, which was inconsistent with the usual provisions of reclamation laws preferring irrigation. Accordingly, in order to carry out the terms of the operating principles, agreed to between western and eastern Colorado, it was necessary to legislate that domestic use be preferred insofar as waters imported from the Colorado River are concerned.

Section 6 is recognition of the recreational and fishing values of the project. The tourist industry is a major one in Colorado. The Fryingpan project is situated in the heart of that tourist area. Accordingly, from the outset, representatives of the Federal Fish and Wildlife Service of the United States Government, the Game and Fish Department of the State of Colorado, as well as representatives of

the National Park Service and the Izaak Walton League, have been constantly contacted and consulted regarding this project. As a result, it is believed that more care and attention have been given to recreational aspects on the Fryingpan project than on any other project in the West. Section 6 recognizes these values and permits their full exploitation for recreational purposes for the benfit of the public. Experience in Colorado has proven the terrific recreational demand that will be made upon the project areas. Some means must be provided for the protection as well as benefit of the public. This has been done.

Section 7 (a), (b), (c), and (d), in their entirety, have been inserted at the request of Mr. Northcutt Ely on behalf of California.

Section 8 authorizes funds to be appropriated.

OPERATING PRINCIPLES

In September 1948, the director of region 7 of the Bureau of Reclamation transmitted to the Governor of Colorado a preliminary draft of his report on this project, and forthwith the Colorado Water Conservation Board, which is the official entity in Colorado charged by law with the responsibility of the development of the water resources of Colorado, created what was termed a "Policy and Review Committee," composed of two representatives of eastern Colorado, myself and Mr. Christy; two representatives of western Colorado, Mr. Hume White and Frank Delaney; two representatives of the Colorado Water Conservation Board, Clifford Stone and Royce Tipton; a representative of the city of Colorado Springs; and the director of the Colorado Game and Fish Commission. These men were charged with the responsibility of reviewing that report and recommending such amendments as were desirable for all interests in Colorado.

An engineering subcommittee was appointed, comprised of Mr. Royce Tipton, consulting engineer for the Colorado Water Conservation Board; Frank C. Merrill, consulting engineer for the Colorado River District Board (a western slope corporation); Mr. R. M. Gildersleeve, chief engineer, Colorado Water Board; C. H. Jex, Ben F. Powell, and J. R. Ritter, of the Bureau of Reclamation. This committee and the engineering subcommittee held many meetings. The engineers made extensive reviews and major recommendations. A subcommittee was appointed to draft the operating principles which, after numerous drafts and amendments, were subsequently approved. The entire matter was then officially submitted to the Colorado Water Conservation Board. The Fryingpan project and these operating principles were officially approved by that board and the Governor of Colorado. The Fryingpan was recognized as an independent development, feasible on its own merits, and as the smallest possible project which could be constructed dealing with the problem of the Arkansas Valley. The name of the project was changed to the Fryingpan-Arkansas project. Maximum beneficial use of Arkansas River water was stressed, and the committee agreed that the project contemplates the greatest possible beneficial use of Arkansas River water and its floodwaters in connection with the importation of small quantities from the Colorado River.

The municipal requirements of the valley cities was realized, and immediate need of 15,000 acre-feet was anticipated with a much larger ultimate need. The committee was in complete agreement on what it terms replacement storage, and the Aspen Reservoir, situated on the Roaring Fork, 1 mile upstream from Aspen, is the result of the work of that committee. It provides an active capacity of 28,000 acre-feet at a cost of $7 million. The reservoir was moved to its present location at the request of representatives of western Colorado. Fish and wildlife interests specified certain minimum stream flows at designated points to protect adequately the fishing values of the Roaring Fork and Fryingpan Rivers, which recommendations were literally adopted, and finally the committee agreed that a project smaller than that described in the Fryingpan project should not be undertaken because it represents the minimum project that can be found justifiable.

All of these matters were formalized in the operating principles which appear commencing on page 20 of Senate Document No. 106, 82d Congress, second session. They recognize that the project contemplates the maximum conservation and use of the diverted waters, the protection of both existing and potential western slope water uses in accordance with the declared policy of Colorado and the preservation of recreational values.

In the Operating Principles—

Section 1 contains the definition of terms.

Section 2 provides for the construction of the Aspen Reservoir on the Roaring Fork River above Aspen, Colo., with a capacity of 28,000 acre-feet which shall be available for replacement purposes in western Colorado.

By section 3, the cost of construction and perpetual operation and maintenance of the Aspen Reservoir is a charge against the project.

Section 4 requires that the Aspen Reservoir shall be completed before any water is diverted to eastern Colorado.

Section 5 states that the primary purpose of Aspen Reservoir is to furnish replacement storage in like manner as if the project were constructed by a water conservancy district organized under the Colorado Water Conservancy Act. In this connection it should be mentioned that such act (Colo. S. L. 1943, ch. 192) provides in substance that any facilities designed for the exportation of water from the natural basin of the Colorado River by a district organized under the act shall be so constructed and operated that present appropriations of water and prospective uses of water for consumptive use purposes in the natural basin will not be impaired or increased in cost because of the diversion.

Section 6 defines the replacement capacity of the Aspen Reservoir and provides the purposes for which such replacement capacity may be used. No charge is imposed for water released for the replacement capacity.

Section 7 defines surplus capacity, provides for the release of water therefrom, and permits the imposition of a charge for water released from the surplus capacity.

Section 8 limits project diversions from Lime Creek to the months of May and June because of anticipated demands upon Lime Creek.

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Section 9 is designed to protect recreational values, including fishing, and requires the maintenance of certain minimum flows at designated points on the Fryingpan River.

Section 10 pertains to diversions from and the maintenance of stated minimum flows on the Roaring Fork River. This section is important and is required because a farmers' mutual cooperative enterprise, the Twin Lakes Reservoir and Canal Co., holds Colorado decrees for the diversion through its facilities of substantial quantities of water from the headwaters of the Roaring Fork River. The Twin Lakes Co. has thus far been unable to utilize its rights to the fullest extent because of insufficient storage capacity on the eastern side of the mountains. In the event of an increase in that storage capacity, the Twin Lakes Co. could divert from the headwaters of the Roaring Fork such quantities of water that the recreational values of the Roaring Fork area might be affected.

The Fryingpan-Arkansas project is so set up that it can by exchange furnish to the Twin Lakes Co. water from other sources than the Roaring Fork, and, hence, it will be possible to maintain minimum flows as recommended by the United States Fish and Wildlife Service and the Colorado Game and Fish Commission. This is a desirable protection to the Aspen area which is nationally recognized for its recreational values. The right of Twin Lakes Co. to divert the additional water and affect the flow of the Roaring Fork River was established by court decree 15 years ago, and therefore is not dependent upon authorization of the Fryingpan project by Congress. The water can be diverted now by construction of additional storage by the Twin Lakes Co. on the eastern slope. The Fryingpan project would prevent the adverse effect of such diversion on fish resources by providing the Aspen Reservoir to replace the water which can, by law, now be diverted, and by making possible an exchange.

Section 11 is a further protection to those interested in recreation. It provides that lands acquired for project construction and operation and water surfaces of project reservoirs will be open to the public for recreational purposes, except in instances where the area is necessarily reserved by the operating agency.

Section 12 recognizes the need for additional water in the Arkansas River Basin for domestic purposes and requires that the project be operated in such a manner that those in eastern Colorado using project water imported from the Colorado River Basin for domestic purposes shall have preference over those claiming or using the water for other purposes.

Section 13 states that the project will be operated in such a manner as to secure the greatest benefit from the use and reuse of imported project water.

Section 14 is very important. The committee is no doubt familiar with the Colorado-Big Thompson project. In the authorization of that project it was required that the project should be constructed and operated in conformity with an agreement between west slope and east slope interests. That agreement is set forth in Senate Document 80, 75th Congress, 1st session. Provision is there made for the construction of Green Mountain Reservoir to furnish replacement storage for existing and potential west slope uses. Some differences of opinion have arisen in regard to Senate Document 80. In order to

assure the west slope people that there is no intent to impinge upon whatever rights they have under Senate Document 80, section 14, provides that such rights shall not be impaired or diminished by the Fryingpan-Arkansas project.

Recognition of those documents which now constitute the law of the Colorado River is given by section 15 which provides that the operation and use of the project shall be subject to the 1922 Colorado River compact, the 1948 upper Colorado River Basin compact, and the Boulder Canyon Project Act. To protect the west slope uses further, it is provided that in the event of necessity to curtail any project uses in order to secure compliance with the aforementioned documents, then before there is any curtailment of the right to store in Aspen Reservoir the diversions for use in eastern Colorado must be curtailed in a quantity not in excess of the capacity of that reservoir.

In section 16 the Secretary of the Interior is given the option to require the transfer to the United States of rights initiated or acquired for the project in eastern Colorado, except, of course, the present vested rights of Colorado water users. Rights to store water in the Aspen Reservoir shall be acquired under the applicable Colorado law as is required by the existing Federal reclamation laws and shall be held in the name of the United States.

The concluding section, section 17, is somewhat of an innovation. The policy and review committee recognize the extreme difficulty of setting up a formula which can be fair and equitable under future conditions which cannot be foreseen. Accordingly, provision is made for a commission upon which the east slope, the west slope, the United States, and the State of Colorado are represented. This commission is empowered to study the operation of the project with particular regard to the agreed operating principles and to make such recommendations for changes as it believes may more nearly bring about the attainment of the ends sought by the operating principles.

REPAYMENT ENTITY

A quasi-public corporation known as a water conservancy district, including portions of all of 11 counties, will be organized under the provisions of the Colorado laws relating to such districts. Members of this committee are generally familiar with this law. It is the type of corporation used as a repayment entity of the Colorado Big-Thompson, the Mancos, and the Conejos projects in Colorado. Accordingly, I will not describe in detail all of the provisions of that law and will simply point out a few of the unique qualities of such districts.

These districts have the power to levy a general tax upon all property within the district which cannot, however, exceed 1½ mills. Inasmuch as this district may have an assessed valuation of approximately $350 million, a 1-mill levy would yield approximately $350,000 a year. A property owner does not have to purchase water for his farm. He has the opportunity to elect whether or not he desires to purchase such water. If he does purchase water, he must pay for it, and the charges imposed per acre-foot are collected in the same manner as his taxes are collected.

In addition to the sale of water to farmers, the district can sell water to towns and cities, and it can rent reservoir space to people who already have water rights but who lack adequate reservoir capacity.

That is the situation of the Twin Lakes Reservoir & Canal Co. as well as the Colorado Fuel & Iron Co. Both of these entities, one for farming and the other for industrial purposes, presumably will desire to rent reservoir space for the storage of water rights which they presently own.

The cities of Pueblo and Colorado Springs have committed themselves to be included within the boundaries of the district, and their city councils have passed ordinances to that effect. Assuming that a repayment contract, acceptable in form to the United States and to the district's attorneys, has been negotiated, an election will be held at which time all tax-paying property owners, who are electors, situated within the district, will vote in favor of or against such a repayment contract. After that election has been had, the district itself allots water to the individual farmers or the various irrigation districts or ditches that desire the same, and, subsequently, all proceedings in connection with the formation of the district, as well as the execution of a repayment contract, are submitted to a court for a confirmation decree. In 1938, the Supreme Court of the State of Colorado upheld the constitutionality of this district law, and since that time it has been copied by many other States and is currently considered the most workable form of entity available for reclamation projects.

ARKANSAS RIVER COMPACT

One other phase of this matter should be mentioned. In 1948 the States of Colorado and Kansas signed a compact relating to the use of Arkansas River water in those States. That compact was later ratified by the State legislatures and is now effective. Article IV–D of that compact provides as follows:

> D. This compact is not intended to impede or prevent future beneficial development of the Arkansas River Basin in Colorado and Kansas by Federal or State agencies, by private enterprise, or by combination thereof, which may involve construction of dams, reservoirs, and other works for the purposes of water utilization and control, as well as the improved or prolonged functioning of existing works: *Provided*, That the waters of the Arkansas River, as defined in article III, shall not be materially depleted in usable quantity or availability for use to the water users in Colorado and Kansas under this compact by such future development or construction.

It would seem clear that the proposed project is well within the requirements of the above-quoted section of the Arkansas River compact. Indeed, there seems little doubt that downstream water users will welcome Colorado River water into the Arkansas River Basin.

PROJECT OPPOSITION

Who are the people that claim the Fryingpan is the entering wedge for the Gunnison-Arkansas project? Who would be affected by the Gunnison-Arkansas project? The truthful answer is that the Gunnison River in its entirety would be affected. Yet not one witness from the Gunnison Valley has appeared here in opposition. Dan Hunter would not appear here if the project were a commitment for the Gunnison-Arkansas. Citizens of western Colorado have not refrained from opposing Denver's claims and they will not refrain from protecting themselves when the Gunnison-Arkansas project is involved. Citizens of Aspen speak only for themselves—not for western Colo-

rado. And western Colorado knows the Fryingpan is not the entering wedge for the Gunnison-Arkansas.

The opposition to the Fryingpan is not "western Colorado." It is Aspen. And where are the oil shale deposits that are of great industrial potentials? Near Rifle. The entire area between Glenwood Springs and Grand Junction is vitally concerned in the oil shale. And that entire area has officially approved the Fryingpan project.

The operating principles specifically incorporated in our authorizing legislation cannot be violated and will not be. They meticulously specify performance to units of measurement as small as 5 cubic feet of water per second. Any statement that these principles are not adequate protection is false.

True, Aspen does not want the Fryingpan. The Colorado Constitution reads:

> The water of every natural stream not heretofore appropriated within the State of Colorado is hereby declared to be the property of the public and the same is dedicated to the use of the people of the State.

It does not say "the property of Aspen." And the people of the State have officially approved the Fryingpan.

I suggest that home problems are for home solution and this committee is not truly concerned in purely intrastate matters.

Two years ago, opponents urged us to wait until the Hoover Commission reported. Maybe it never will. And if it does, its report may not be approved by Congress. In any event, until the report is made and becomes law, it is useless to speculate on its content and effect.

Mr. Chairman, I also have a joint statement by Mr. Harold Christy and myself pertaining to the 160-acre land limitation law of the Bureau of Reclamation as it applies to this project, which I would like to give at this time.

Section 2D of S. 300 exempts the project from the limitations of the 160-acre law provided such lands have an irrigation supply from sources other than a Federal reclamation project. The project does not involve or contemplate the irrigation of any new land and only alleviates 50 percent of existing shortages. The proposed exemption is not new. The Truckee storage project, the Colorado-Big Thompson project both have previously been exempted.

The proposed exemption is supported by the following data concerning land ownership and water use in the Arkansas River Valley in Colorado.

Single ownerships over 160 acres.—As will be noted there are 234 of these ownerships covering 75,030 acres with an average size of 320 acres. The range varies from 161 acres to 1,767 acres with the vast majority falling under 200 acres.

Approximately 99 percent of these cases involve family ownership. Ownerships of this type could very easily be split down below the 160- or 320-acre limitation, and, in all probability, if water deliveries were in question this would be done. Since this is the case, we have left these acreages out of the total column showing the lands that would be affected by reclamation law.

Joint ownerships over 320 acres.—These ownerships cover an acreage of 26,983 acres with an average size of 551 acres. They range in size from 324 to 1,725 acres. The majority of these ownerships also fall in the lower size brackets, around 350 to 400 acres.

Many of these are partnerships and may actually involve two men and their wives.

Sugar companies, banks, farm operating companies, etc.—There are 42 ownerships of this type covering 14,671 acres with an average size of 349 acres. These ownerships vary in size from 1 acre to 4,497 acres.

In considering these owners, one should keep in mind the type of farm operation being carried on by these companies. All the company ownerships of any appreciable size are split up into individual farm units operated under a tenant situation. These units, almost without exception, are less than 320 acres and the majority are less than 160 acres in size. The majority of the land falling in this category is in the ownership and operated under the supervision of one company. The tendency over the years has been for companies to sell their land. At one time extensive holdings were held by several companies. However, at the present time none of these companies, with the exception of two, have any extensive holdings. These lands have been sold in 160- and 320-acre units.

The companies carry on extensive experimental programs on lands set up specifically for this purpose. These experimental programs are extremely beneficial to the irrigated farmers in the Arkansas Valley. Technical assistance needed in the application of production methods developed by the sugar companies is not only rendered by these companies to the farmers operating the sugar companies' farms, but is also furnished, at no direct cost, to all individual farmers in the Arkansas Valley who are interested in the production of sugar beets. Over the years this has proven extremely beneficial to the general economy of the area.

As will be noted in the column showing the range in size of these ownerships, the minimum size varies from 1 to 23 acres. These smaller acreages are usually small tracts used for beet sugar factories, alfalfa mills, and so forth; however, these tracts still retain a water right. Consequently, they show up in an investigation of this type. The actual water delivered is usually negligible.

Total ownerships affected by reclamation law.—The totals shown in this section of the table do not include those ownerships shown in item 1, single ownerships over 160 acres. The reason for this was given under the discussion of this type of ownership. Total ownerships affected by reclamation law amount to 91 or less than 2 percent of the total owners, 41,654 acres or approximately 13 percent of the total acreage, served by the project. There are approximately 4,550 farms in the project area.

WATER SUPPLY

In order to determine just how much water would actually be supplied to these ownerships if they received the same average supply as other land in the project area, we used the average size unit in each county under each type of ownership, multiplied it by the average project supply, 0.5 of an acre-foot per acre, and divided it by 3 acre-feet, which represents a full headgate supply. On this basis, ownerships falling in the single ownership category, over 160 acres, would receive sufficient water to furnish a full supply for 58 to 75 acres. Under a joint ownership situation this varied from 83 to 257 acres and under the company situation it varied from 8 to 571 acres. This large

acreage (471 acres) occurred in only one county. All of the others fell below 160 acres except in one case which was found in Lake County and ran 257 acres. The 257 acres is meadowland and has nearly a full water supply at present and probably would not buy any project water.

PROJECT OPERATION

The Arkansas Valley in Colorado is a valley that has been developed by small landowners. All of the ditch companies have been developed by thousands of small landowners banding together into mutual companies to construct, operate, and maintain irrigation systems. Many of the ditches were started by promoters, forming stock companies or utilizing eastern capital; however, these soon faded out of the picture, either going broke or selling out to landowners served by these early ditches. At the present time all of the ditches in the Arkansas Valley are mutualized or, as in the high mountain country, are individually owned. Under this method of development one always finds the major portion of the ownerships running around 80 to 320 acres, with only minor percentages of the area being operated by companies or exceptionally large landowners.

This method of development makes the application of the 160-acre limitation nonimportant in that:

Water deliveries.—Water is delivered in the Arkansas Valley on the basis of shares in the various ditch companies. If a ditch diverts 50,000 acre-feet of water it is distributed equally among the shareholders through laterals, from main ditches to individual farms. Consequently, if a ditch company buys 500 acre-feet of project water, this water would be delivered to the main canal thence to the laterals and then through the use of fixed division boxes to the farms, according to their shares. This type of delivery system makes it almost impossible to exclude a few landowners from receiving the benefits of water purchased by the ditch system.

Types of individuals making up the ownerships exceeding the 160-acre or 320-acre ownership.—The individuals involved in this category are the leaders of the community. They represent the more progressive farmers. They are the more aggressive people who through hard work and good management have succeeded in accumulating acreages in excess of the limitation set up by this law. These men are not fly-by-night promoters, neither do they represent big-development companies. They are farm operators as well as owners. They are developers of markets and marketing outlets. They are the backbone of the community and of the economy of the area and should not be penalized for their thriftiness.

GENERAL STATEMENT

In summarizing this data the following points are very apparent:

1. Percentagewise these ownerships, compared to the total ownerships in the valley, are minor, less than 2 percent.
2. There are no promotional development companies operating appreciable areas in the Arkansas Valley.
3. In only two cases does the amount of water proposed for delivery to any of these units exceed that which would be required for 160 acres and one of these probably will not purchase any water.

(The tables submitted by Mr. Beise follow:)

Ownerships affected by reclamation law, February 1955

JOINT OWNERSHIPS OVER 320 ACRES [1]

County	Total 1955 survey		Range in size	Average size, owner ships	Full supply from system for—
	Number	Acres			Acres [2]
Lake [3]	3	3,854	903–1,725	1,285	[3] 257
Chaffee	3	1,250	393– 442	417	83
Fremont	1	602	602	602	120
Pueblo	4	2,100	360– 656	525	105
Otero	6	3,311	365– 653	552	110
Crowley	7	2,975	324– 775	425	83
Bent	8	4,817	382–1,443	602	120
Prowers	17	8,074	329– 970	475	95
Total	49	26,983		551	110

SINGLE OWNERSHIPS OVER 160 ACRES [4]

Lake [3]	6	1,794	194– 460	299	60
Chaffee	9	2,631	192– 598	292	58
Fremont	3	632	190– 249	211	42
Pueblo	11	4,132	170– 800	377	75
Otero	59	17,966	162– 897	305	61
Crowley	30	8,593	167– 973	286	57
Bent	46	15,615	162–1,767	339	68
Prowers	70	23,667	161–1,714	338	68
Total	234	75,030		320	64

SUGAR COMPANIES, BANKS, FARM OPERATING COMPANIES, ETC. [5]

Lake [3]	0	0		0	0
Chaffee	4	321	23–150	80	16
Freemont	1	566	566	566	113
Pueblo	3	467	5–249	156	31
Otero	17	6,797	1–4,497	400	80
Crowley	10	3,426	15–1,660	343	69
Bent	6	241	1–150	40	8
Prowers	1	2,853	2,853	2,853	571
Total	42	14,671		349	70

TOTAL OWNERSHIP AFFECTED BY RECLAMATION LAW [6]

County	Total 1955 survey		Average size, owner-ships	Full supply from system for—
	Number	Acres		Acres [2]
Lake [3]	3	3,854	1,285	[3] 257
Chaffee	7	1,571	224	45
Fremont	2	1,168	584	117
Pueblo	7	2,567	367	73
Otero	23	10,108	439	88
Crowley	17	6,401	377	75
Bent	14	5,058	361	72
Prowers	18	10,927	607	121
Total	91	41,654	458	92

[1] Includes partnerships, joint tenants, etc.
[2] Using 0.5 of an acre-foot for average Fryingpan-Arkansas project deliver to 322,000 acres of irrigated land served.
[3] Mountain meadows.
[4] Single ownerships over 160 acres dropped from the grand total on the assumption titles would be changed to joint ownerships.
[5] Companies, in all cases, are operating diversified tenant farm units less than 320 acres in size.
[6] Single ownerships over 160 acres dropped from the grand total on the assumption titles would be changed to joint ownerships.

Mr. BEISE. Mr. Chairman, I would ask that the statement of Mr. Harry Barnes, heretofore handed to the clerk, be considered as read and made a part of the transcript of the testimony of this proceeding. Mr. Harry Barnes is the city engineer for Rocky Ford. The statement pertains to the water supply of the valley towns east of Pueblo.

Mr. ASPINALL. We cannot accept the part of your request which asks that it be made a part of the record as if read because Mr. Barnes is not here, but, with that exception, the statement will be accepted and made a part of the record.

(The statement referred to follows:)

STATEMENT OF HARRY BARNES, CITY ENGINEER, ROCKY FORD, COLO.

My name is Harry Barnes. I have been a resident of the Arkansas Valley for 30 years. For the past 17 years I have held the position of city engineer for the city of Rocky Ford. I have held various offices in the American Water Works Association. During the past 15 years I have been in complete charge of the municipal waterworks for the city of Rocky Ford. During that time I have rendered some engineering service to practically all of the smaller towns of the Arkansas Valley and through this service have become familiar with about all of their water problems. Also, through association with other municipal officials, I have learned to understand the problems encountered by the cities that employ their own engineers.

When towns were founded in this area, water, from the first day was the major problem. Shallow wells, for the most part, were found to produce a water that was so hard and so alkaline in nature that it could not be used satisfactorily. Municipalities then went to artesian wells. At depths ranging from 750 feet to 1,200 feet they obtained a very limited supply of very soft water. Even then many of these wells carried such an extent of iron that some treatment was necessary. Within a few years most communities outgrew the supply these wells furnished. It was then necessary to go in search of surface supplies or to use the extremely hard shallow wells. Those towns that have stayed with the deep wells have been forced to restrict building, with the ultimate result that many of them are smaller than they were 20 years ago.

Actually, gentlemen, we have some residents of every town and city in the valley, as well as all of the country population, who are forced to haul all of their domestic water. In many instances it is necessary to haul this water several miles. The average price paid for this water is $5 per thousand gallons, or $1,630 for each acre-foot of water used. This has been paid for many years. Many homes in the valley have no means of sewage disposal, caused by a lack of water to flush toilets. This in many areas does not point toward a modern sanitary condition.

The climate of the Arkansas Valley is of a semiarid nature. The annual rainfall is from 11 to 16 inches. This is too little to let most plants exist. Irrigation is necessary for us to have lawns in our towns and cities. And I believe that you will agree that lawns and gardens are necessary for modern living. The fact that irrigation is necessary makes our daily per capita use of water run from 200 to 450 gallons.

Another bad feature of the water situation in all of the valley municipalities is the fact that no storage exists. No town or city east of the proposed Pueblo reservoir has any storage. By that I mean, when the pumps stop there is nothing to fall back on. Take our small community whose only supply is a 1,200 foot well. Suppose a shortage of power or a well casing failure should stop production of that one well. A city without water could very easily become a city where disease could run rampant. The large city tries never to have less than a 6-month supply in storage. Please compare that with the situation that exists in our valley.

Below we are going to present very briefly to you the names of the towns and cities which would be affected by the Fryingpan-Arkansas project. In this I am going to show the present source of domestic water, and the population served and the hardness of the present supply. Please observe that each community would be affected in a different way, but every community would be benefited.

Salida, Canon City, and Florence.—All being located at high altitudes along the Arkansas River all derive a very nice water from that river. The diversion plan would benefit these cities in that with a higher river they would have a more

ample supply at all times of the year. The total population of these 3 towns is approximately 15,000.

Fowler.—Is presently supplied from natural springs. Hardness is 10 grains per gallon. Population is 1,025. This town has made no application for additional water. Most of their citizens know that any increase in population would necessitate more water. The springs are running at full capacity at the present time.

Manzanola.—Obtains its water from a depth of 1,200 feet. The water is reasonably soft but contains sulphates in such an extent that it is eating up the distribution system. They have barely enough water to supply present needs. Residential building has been curtailed for many years. A major failure in a well casing would put the town out of water for months.

Rocky Ford.—Serves a population of around 5,000 people. Obtains its present supply from the Arkansas River. Has a filtration plant and because of the highly polluted raw water it is forced to a very expensive treatment procedure. Hardness averages about 30 grains per gallon. When the river is low they are forced to pump their entire supply three times.

La Junta.—Serves a population of about 8,000. Present supply is obtained from the bed of the Arkansas River. Hardness is around 57 grains per gallon. Too hard for the commercial water softener to handle. The city has been greatly handicapped by the hardness of the water.

Las Animas.—Serves a population of around 4,000 persons. Water is taken from shallow wells. Hardness is 78.5 grains per gallon. Imagine, gentlemen, trying to live with a water supply that hard.

Lamar.—Serves a population of 8,000 persons. Present supply is a combination of wells and surface water from Clay Creek. Hardness is around 21 grains per gallon. As long as the surface does not lower the city feels that it will continue to have an ample supply of only fair water.

Swink.—Serves about 400 people. Obtains water from a well 735 feet deep. Supply is very limited. Residential building is prohibited. With better and more water the town would grow. A large sugar factory located here is forced to supply its own water, for both its residences and for its operation.

Eads.—Serves a population of about 1,200. Gets a very limited supply of water from two deep wells. Supply is used for domestic water only. The watering of lawns is usually prohibited. Growth is limited because of the shortage of water. Another instance where a major breakdown could put the town out of water for months.

Wiley.—Serves about 450 persons. Water is obtained from the Arkansas River. They have about an 800,000-gallon reservoir and a small high-pressure filtration plant. When the river is low for a long period of time and the ditch from which they receive their supply is out of water the town is out.

Crowley.—A small community of about 300 persons. Water supply is from shallow wells. Supply is very limited and water is extremely hard. This community has not had a chance to expand over the years because of their being unable to furnish an adequate supply of water to the inhabitants now there—let alone any new population.

Ordway.—Serves a population of about 1,200 persons. Water is derived from better than average wells. The town has a reservoir which holds about a 20 days supply. The town also has a softening plant. At present is doing very well; if the ground water supply holds up they, with no increase in population, are in a fair shape for domestic water.

Thus, gentlemen, we have shown you a brief résumé of 14 communities, who serve some 44,000 persons. These communities have, in the past years, spent literally millions of dollars, acting upon the best engineering ability available, to do the best that could be done in the way of providing as much water and as good a water as could be had. Only in very rare instances can it be said that these millions have been spent wisely, because we are still short of an adequate supply of soft healthful water. We in the Arkansas Valley, are fully aware of the fact that our towns and cities never become any larger than their water supplies. We also feel that a price cannot be placed on the most precious commodity the world possesses, namely an adequate supply of soft, pure water.

Mr. BEISE. I make the same request for a statement by Harry C. Reese, whose statement the clerk has.

Mr. SAYLOR. Off the record.

(Discussion off the record.)

Mr. ASPINALL. The statement of Mr. Reese will be accepted and made a part of the record.

(The statement referred to follows:)

STATEMENT OF HARRY C. REESE

I am Harry C. Reese. I have been a resident of Colorado since 1946. From 1947 to 1950 I was manager of the chamber of commerce at Florence, Colo. Since 1950, I have been manager of the chamber of commerce at LaJunta, Colo. I am a graduate of Fenn College, Cleveland, Ohio, and of the Southwestern Chamber of Commerce Institute, Dallas, Tex. I am an active member of the Colorado State Chamber of Commerce Managers' Association and of the Mountain States Association of Chamber of Commerce Managers.

My specific purpose in appearing before you is to represent the community development in 10 of the smaller communities located in the Arkansas Valley.

The position of the two metropolitan areas located in the project area, Colorado Springs and Pueblo; will be represented by other speakers.

The 10 communities which I am representing are Leadville, Salida, Canon City, Florence, Walsenburg, Fowler, Rocky Ford, La Junta, Las Animas, and Lamar. These towns are strung out over an area that is approximately 300 miles in length from Leadville on the west, loacted near the headwaters of the Arkansas River to Lamar on the east located 32 miles from the Colorado-Kansas line.

From the census figures in 1930 these 10 communities had a total population of 41,051. By 1940, these communities had an increase in population of 3,002, for a total of 44,053. By 1950, this population had increased to 50,777 or an increase of 6,724 over the 1940 figures.

The introduction of supplemental water into the Arkansas Valley in the proposed Fryingpan-Arkansas project affects our area in two ways. First let me discuss with you the effect upon the living conditions of our people by giving you a picture of the present situation and the anticipated improvement with supplemental water.

We are seriously short of domestic water in our towns. West of Pueblo, communities depend on streamflow diversion or mountain watersheds for municipal use. East of Pueblo, supplies are largely from shallow wells. These latter communities have storage facilities equal to 1 day's supply or less. Pumping capacities are taxed to the limit during the period of June through September. In the summer months, municipalities maintain a constant and desperate struggle to keep water supplies in line with peak demand.

During the 4-month period of peak demand drastic restrictions are placed on domestic users. The use of water for lawns and gardens is banned during most of the day in this period, so that adequate supplies will be available and line pressure maintained.

While the quality of the water in 5 of the communities west and south of Pueblo is not too bad, the other 5 towns have supplies with excessive sulfates resulting in water that averages about 50 grains hardness per gallon.

This hard water causes an equal burden to the housewife, the municipality, and the industrial user. To be satisfactory for household use, this water must be treated or the soap bill soars, the dishes are streaked, the clothes not clean, and the scrubbed floors spotted.

It is common in this area for domestic users to purchase water from commercial wells in order to get a reasonable supply of soft water for household use. This water, stored in cisterns, is often hauled for several miles at an average cost of $5 per thousand gallons.

In city mains, this hard waters causes serious encrusting and rapid deterioration of pipes. Waterline breaks, valves that are eaten out are all costly to municipal operations. The industrial user is plagued in the same manner in his boiler systems and in his processing water. The cost of building a treating plant to render the water acceptable for industrial use very often is equal to the cost of building and equipping the plant itself.

With the availability of supplemental water for domestic use, a large share of the problems of lack of municipal water supply and lack of quality water would be eliminated. The use of the proposed Pueblo Reservoir for the storage of municipal supply would overcome the present lack of storage.

The availability of quality water of 4 to 6 grains hardness per gallon chlorinated in the proposed Pueblo treating plant and made available by pipeline to

the towns east of Pueblo would far surpass the quality of the present supply.

The need for a supply of quality water for human consumption is paramount. We are short of this water now. Our population is on the increase. We strongly feel that the development of additional domestic water in the Fryingpan-Arkansas project is necessary to maintain our present population level and allow us a normal rate of growth in our communities.

The second effect of the introduction of supplemental water is in the economic pattern of the area. Basically, this is an agricultural area. Farming and ranching, irrigated and dryland, extends the length of the valley and is the basic structure of the area.

With this economy, the processing of agricultural products is important. The refining of sugar beets, canning of fruit and vegetable crops, feeding and processing of livestock, the production of animal feeds and organic fertilizers, and recently the new development of chlorophyl extraction are all important operations in the communities of the area.

Raw materials available in the area play a strong part, too. Within the region are deposits of feldspar, fluorspar, lead, zinc, manganese, gold, silver, nonmetallics, oil, and coal. Many of these raw materials are in various stages of productive development, others are virtually dormant.

Colorado's tourist business, a $220 million operation in 1951, is of much importance to the Arkansas Valley area. For upon it depends thousands of small independent businessmen. Motel and resort operators, filling stations, restaurants, sports dealers, and many others make their livelihood from those who come to see and enjoy Colorado's majestic peaks and scenic beauty.

Each of these economic phases is important to the well being of our area. Each phase suffers and is limited by water supply and quality.

The increased efficiency of existing irrigation ditch systems can only be brought about by supplemental water. The urgent needs for domestic water and for industrial water have been filed at the expense of agriculture. Limited crops and low yields are an old story to our farmers. Droughts, low runoff periods, and overappropriated water rights all take their toll of agricultural production.

National markets for high quality Colorado grown products such as sugar beets, onions, cantaloups, vegetables, seeds, and alfalfa meal already exist. With supplemental water, Arkansas Valley farmers can grow higher cash value crops and increase their yields of the existing crops. This is sound development, and it will materially strengthen the economic basis of the entire region.

The production of fine Colorado beef, lamb, and turkeys is on the increase and finds a ready market throughout the Nation. Increased feed supplies in the project development will greatly enhance this type of foodstuff production necessary to a growing national population.

Strategic minerals and nonmetallics processed in the project area are now limited by lack of power and water. The major production is in copper, lead, zinc, gold, and silver. Other metal development prospects are in aluminum, bismuth, cadmium, iron, manganese, molybdenum, and nickel.

Among the producers, the Reynolds Mining Co. in the Salida area indicated that their fluorspar operations will be limited in the near future by lack of water and power. The Resurrection Mining group in the Leadville area in their production of lead, zinc, and other strategic metals will be hampered to some extent by water but mainly by lack of power.

Coal is a large resource in the Walsenburg, Florence, and Canon City area. The trend toward the use of coal in high temperature processing for byproduct extraction and the production of synthetic fuels is rapidly coming upon us. To develop these large deposits of both high- and low-grade coals, supplies of water and power must be available.

There are instances of existing industry being limited by the lack of quality water. Canning plants in the area are hampered both by the lack of agricultural water as well as the lack of a quality supply for processing. Sugar-beet companies have been faced with water shortages in the midst of their processing campaigns in the fall. The Santa Fe Railroad at its division point in La Junta treats 61 grain water to 1 grain hardness on an average of over 7 million gallons per day. A savings of thousands of dollars annually would occur if a better quality water were available.

The availability of quality water and hydroelectric power from the proposed Fryingpan-Arkansas project would stimulate the expansion of vast mineral resources in the area. Existing industry unhampered by the lack of water and power would expand and develop at rate consistent with market demands.

With supplemental water and power bringing increased agricultural yields, greater livestock production, expansion of industry and raw-material development a far broader taxing base would come into being in the project area. The increases to local and State taxing units, along with the enhancement of Federal tax receipts, would come as a natural result of the project development.

The tourist business, an important facet of our area, would receive a tremendous boost in both eastern Colorado and western Colorado from the development of the recreational features of the proposed project. It is important to note that this project is the first in Colorado to be planned with the full cooperation of Federal, State, and local fish and wildlife interests. Thousands of independent small business men who work to serve the tourist industry will be directly benefited as the project materializes.

To summarize: The Arkansas Valley has been and is now seriously short of domestic, agricultural, and industrial water. The importation of surplus water from western Colorado to our deficient area in eastern Colorado is our only feasible means of acquiring water to maintain our living conditions and economy.

Through their association together and through the proposed formation of conservancy districts, the people on our area have demonstrated that they are willing to repay a large share of the project costs through the purchase of water and the purchase and sale of power.

For the people of the Arkansas Valley, first and foremost, additional water is a must. To expand and develop industry and natural resources, supplies of quality water and available power are a must. If our area is to maintain the existing economy, to better our living conditions and to expand to a maximum development to take our place in a strong healthy nation, we earnestly request that you give every favorable consideration to the early construction of the Fryingpan-Arkansas project.

Mr. CHENOWETH. Will the chairman yield there?

Mr. ASPINALL. Yes.

Mr. CHENOWETH. I would like to make an observation. I wish to assure my good friend from Pennsylvania there is no disposition on the part of the witnesses in presenting their statements in support of this project to withhold any facts or conceal any information. What we have been trying to do is to cooperate and expedite these hearings. I think the chairman is entitled to great credit for the very able and competent manner in which he has conducted these hearings. We have tried to cooperate with him. I think he has done a very splendid job in the short space of time available in giving these witnesses every possible opportunity to be heard.

I also regret, I will say to my distinguished colleague, that the witnesses do not have the time to present these statements and read them word by word, because they would be much more effective and much more impressive; but the time is not available, and we are doing the best we can.

Mr. SAYLOR. I am not objecting to the fact that the Chair is conducting the hearings in the manner in which he is. I think he is doing a yeoman job considering the tremendous amount of legislation that is before this committee. What I am objecting to is in having witnesses—I am not blaming this on the witnesses, because I do not think any one of them has made a statement here yesterday or today that they do not seriously believe. But what I am objecting to is that they are handing in their statements and having them made a part of the record without anybody having a chance to examine them prior to the time they come here and take the witness chair, so if there were some question that you would like to ask them in particular, whether it be the proponents or opponents, you would then have an opportunity to develop some point or points which have been presented in the testimony. That is what I object to.

Mr. CHENOWETH. I am sorry. Had I known of the gentleman's interest, I would have made every effort to have the statements made available ahead of time.

Mr. ASPINALL. The Chair would suggest that the Congressman from Colorado, Mr. Chenoweth, will be under a heavier responsibility when we get into executive committee consideration than if we had the witnesses here, but that is one of those things that cannot be avoided.

Mr. BEISE. Mr. Chairman, in light of the objection of the gentleman from Pennsylvania, I will not offer for the record, but I would like to submit for the information of the committee members a statement by the Colorado Public Expenditure Council, prepared by Prof. E. T. Halaas of the University of Denver analyzing the Fryingpan-Arkansas project. The Colorado Public Expenditure Council has been the watchdog of the taxpayers of not only the State but the surrounding area for many years, and I think this will prove to be of assistance to the committee.

Mr. ASPINALL. It will be accepted and made a part of the file.

Mr. CHENOWETH. Mr. Chairman, I wonder if it would be possible to have this printed in the hearings. This is a rather important statement on this project. I think it would be of great interest to the members of this committee. I feel it should be made a part of the record.

Mr. ASPINALL. The request has been made. Is there any objection? Hearing none, it is so ordered.

Mr. SAYLOR. Mr. Chairman. Again I have not even had a chance to look at what is in here. What we have just done is to place an unusual burden upon the finances of this committee by requiring a map that we find necessary to have duplicated. It has been the policy of this committee not to do that.

Mr. CHENOWETH. I withdraw the request as far as the map is concerned.

Mr. ASPINALL. The gentleman from Pennsylvania is not exactly correct, because this map (indicating) was reproduced last year in the hearings. The map to which he refers here in the exhibit submitted is no more difficult to reproduce than the one we had last year.

(The request of Mr. Chenoweth was later withdrawn and the document referred to will be found in the files of the committee.)

Mr. ASPINALL. Do you have any further statement, Mr. Beise?

Mr. BEISE. Yes, Mr. Chairman. I would like to very briefly comment on four aspects of the Fryingpan project: What the Fryingpan does to the Aspen area; specifically then on the Aspen Reservoir; and then the future of that area; and the position of southern California as stated at the Senate hearings.

Not one drop of water is proposed to be diverted from the Roaring Fork River above the town of Aspen. There are many streams in Colorado which late in the season are dried up by diversions into irrigation districts, and it is true that rarely above the town of Aspen the Roaring Fork is at times dried up by diversion. But the complaints are louder in connection with that river than other rivers because the water goes to eastern Colorado by means of the Twin Lakes diversion.

Members of this committee can be assured that the Twin Lakes Co., a private corporation, privately owned, a mutual ditch company, has the legal right to divert the water that it does divert. Otherwise

they would be stopped by the State engineer of Colorado, who administers our streams.

The committee can equally be sure that the Twin Lakes people will increase those diversions ultimately an additional 15,000 acre-feet, as they have the legal right to do under conditional decree in the district court. So that the Twin Lakes development will come about in all probability whether or not the Fryingpan-Arkansas project is ever built.

I say that the Fryingpan project, therefore, protects the area above Aspen because it makes possible an exchange, as is stated in the operating principles, and which are specifically made a part of H. R. 412 by section 3. So that the area above Aspen will be less affected after the Fryingpan-Arkansas is built than it is now.

The Fryingpan-Arkansas also protects the area below Aspen by providing for the construction of a 28,000 acre-foot reservoir as a part of the project. Let me say about this Aspen Reservoir—it is a new reservoir to be built which was proposed to be built at Rudy on the Fryingpan River, but nevertheless it was moved to Aspen upon the request of western Colorado's representatives. It is built nine times larger than the outstanding western slope engineer said was necessary to build it for replacement. It was done so in order to make maximum use of the site. Mr. Clifford Jex and Mr. Frank Merriell, an esteemed engineer from western Colorado, specifically approved, those men did, the change in location of that reservoir to the Aspen site and in its present capacity. It will never cost the town of Aspen or the area in western Colorado anything for construction or maintenance.

Now as to the future. Let me say that replacement reservoirs are only required by the water conservancy district law. If you do not create such a corporation, any person or individual or corporation in Colorado can divert western Colorado waters without building any reservoir any place at any time. The only reason that we are talking about an Aspen Reservoir in this case is that the project under which this corporation will be organized, the water conservancy district does require a replacement, and that is the Aspen Reservoir, and it will protect the area below Aspen.

Let me say just briefly about southern California.

The Fryingpan-Arkansas is not a participating project in the upper Colorado River storage project. The Fryingpan-Arkansas was approved by southern California at the time of the 82d and 83d Congresses. Southern California, however, has reversed its previous endorsement at this session and now says that the two, the upper Colorado and the Fryingpan, are, so to speak, one ball of wax, which simply means that southern California will at any time oppose any diversion either in or out of the basin in the upper basin States.

Let me say this: That California had six objections to the Fryingpan-Arkansas project in its official comment. Five of the six objections were specifically adopted at their request and are now contained in sections 7 and 8 of H. R. 412. Section 7 has 4 subdivisions, (a), (b), (c), and (d), being respectively that the compacts and treaties shall govern, that individuals and State officials and Government officials shall be bound thereby, that no exchange of water shall be made utilizing Colorado River waters and saving Arkansas River waters to deliver to Kansas, and, lastly, that this Congress by au-

thorizing the Fryingpan-Arkansas does not place a stamp of approval on any interpretation of those documents, compacts, and treaties of the Colorado River.

Now all of that is set forth, as you have read, in section 7 (a), (b), (c), and (d) of H. R. 412.

Section 8 was a verbatim adoption of section 6 of the Senate bill as passed by the 83d Congress, in that it specifically deletes any authorization to investigate what has been called the Gunnison-Arkansas project. That was done at the request of southern California, and it is H. R. 412 as introduced. In other words, 5 out of the 6 amendments that those gentlemen requested are now contained in H. R. 412, and the only request they made which is not included is that with reference to salinity, in that they asked a rider in effect be put on H. R. 412 which would permit the Secretary of the Interior to study the salinity conditions of the Colorado River by reason of the authorization of the Fryingpan-Arkansas, and our answer simply is that any project which diverts less than one-half of 1 percent of the average annual flow of the river, to tie such a large kite on such a small dog's tail is an absurdity which answers itself.

In conclusion, let me say this: If you had a river that reached from Washington to New York City and you had to get the backing of every landowner on that river, you have some idea of the problem of the project proponents, and that has been done in connection with the Fryingpan-Arkansas. The river is over 300 miles long on the eastern slope, and yet all interests from all parts are back of it.

If there was anything wrong with this, certainly we would have heard of it long before now. I mean specifically in eastern Colorado.

And we say in conclusion that the Fryingpan-Arkansas is the smallest possible project which is feasible, and each segment of it is vital to all.

Thank you very kindly.

Mr. ASPINALL. Does that conclude your presentation?

Mr. BEISE. It does.

Mr. ASPINALL. The time from now on this morning has been set aside for the opposition. It may be necessary to call you gentlemen back later on for examination if we cannot find the time this afternoon.

With the understanding I have had relative to the programing, I feel it is mandatory on my part to excuse you from the table at this time, holding yourselves in readiness today or tomorrow, as we see fit, and have the opposition take the time now.

Mr. SAYLOR. Will the chairman yield?

Mr. ASPINALL. Yes.

Mr. SAYLOR. Following up the comment which I made heretofore with regard to not having had an opportunity to examine any papers we have admitted here and made a part of the record, "The Fryingpan-Arkansas project," prepared and published by the Colorado Public Expenditure Council, by E. T. Halaas is, as near as I can determine, nothing except a tirade against myself.

I want to tell you, if the proponents of this legislation think they have done themselves any good in trying to create any impression with the Congress by personal castigation, I want to tell you, up until now I was inclined to go along and try and help you, but if this is

going to be your policy, I am afraid that you have done yourselves more harm this morning by these tactics than you have good.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. No. I am through.

Mr. CHENOWETH. I wish you would designate the part that you object to.

Mr. ASPINALL. The Chair has made its decision, and we are going along with the opposition at this time. The Chair did not wish to introduce this, he did not know what it was; but there was no objection raised, so it is in there now and we will have to abide by our decision.

At this time, appearing in opposition to the legislation before this committee, we have Mr. L. K. Olson, attorney in Washington, D. C., representing certain interests in western Colorado. Accompanying him at the table is Clinton B. Stewart, attorney-at-law of Aspen, Colo.; William Stapleton, county clerk of Pitkin County, Colo.; and Orest Gerbaz, a lifetime resident, farmer and livestock man, of Pitkin County, also a county commissioner of Pitkin County.

Gentlemen, we are glad to have you before the committee and the time has been reserved for you this morning. You may proceed. Who will be first?

Mr. OLSON. Mr. Gerbaz.

STATEMENT OF OREST GERBAZ, PITKIN COUNTY COMMISSIONER, MEMBER OF COLORADO RIVER WATER CONSERVATION DISTRICT BOARD

Mr. GERBAZ. My name is Orest Gerblaz. I am a rancher at Woody Creek in Pitkin County. My brothers and I operate the Gerbaz Ranch which is approximately 1,100 acres. We raise cattle, sheep, hay and grain. I know something about farming in this part of the country because I have been at it for 40 years. I am also one of the commissioners of Pitkin County and I am a member of the Colorado River Conservation District Board.

I am against the Fryingpan-Arkansas project because it is not sound to start with, and it is going to hurt my county and several adjoining counties on the western slope. In fact, the 21-county Western Slope Commissioners Association went on record in 1953 and 1954 opposing this project. So you can see the opposition isn't confined to Aspen.

There have been people appearing before you who left the impression that the only opposition was a couple of wealthy gentlemen farmers. Nothing could be farther from the truth. The real opposition is from the people who make their homes there and make their living there. Besides the county commissioners association of the western slope, the Colorado River Conservation District, which is a statutory board for the Colorado River comprising eight counties in the upper Colorado River Basin, went on record that Fryingpan-Arkansas should be deferred until after the upper Colorado River storage project is authorized and constructed. For the record, I am attaching a copy of their resolution, which I will read.

62757—55——14

RESOLUTION

Whereas there have been introduced in the first session of the 84th Congress, bills for the authorization of the Colorado River storage project and participating projects—upper Colorado River Basin (project planning report 4–82.81.1), and there will probably be introduced bills for the authorization of the Fryingpan-Arkansas diversion project—Colorado (project planning report 7–84.49.1); and

Whereas the first of these projects is one for the regulation of flow and control of supply of water of Colorado River in the upper basin, in its entirety for the improving and increasing of the total usable amount of water in the upper basin of Colorado River; and

Whereas the second of these projects is for the diversion of water from the natural basin of Colorado River to that of Arkansas River, and consequently will result in the diminution of the total in-basin supply of Colorado River water, to the prejudice of uses within the natural basin: Now, therefore, be it

Resolved by the Board of Directors of The Colorado River Water Conservation District, That it earnestly calls upon Colorado Senators and Representatives in the 84th Congress to use every means within their power to assure and insure that the Colorado River storage project shall be authorized prior to, and take precedence over and be constructed before, the Fryingpan-Arkansas diversion project in order that the supply of water within the natural basin shall be conserved for uses within that basin and not be unduly diminished by the prior authorization or building of the Fryingpan-Arkansas diversion project; and be it further

Resolved, That this resolution be sent to Senators and Representatives from Colorado in the 84th Congress; To the Honorable James E. Murray, chairman, Interior and Insular Affairs Committee, United States Senate; To the Honorable Clinton P. Anderson, chairman, Subcommittee on Irrigation and Reclamation, United States Senate; To the Honorable Clair Engle, chairman, Interior and Insular Affairs Committee, House of Representatives; To the Honorable Wayne N. Aspinall, chairman, Subcommittee on Irrigation and Reclamation, House of Representatives; To the Honorable Douglas McKay, Secretary of Interior Department; And to the Honorable Edwin C. Johnson, Governor of Colorado.

STATE OF COLORADO,
County of Garfield, ss.

I, F. C. Merriell, secretary to the board of directors of the Colorado River Water Conservation District, do hereby certify that the above and foregoing resolution was adopted by them at meeting held in Grand Junction, Colo., November 6, 1954, and that the foregoing is a true, full and correct copy of the resolution as so adopted. Subscribed this 25th day of January A. D. 1955

F. C. MERRIELL,
Secretary to the Board of Directors of the Colorado River Water Conservation District.

Mr. GERBAZ. In the Senate hearings the committee was left with the impression that all the REA's were in favor of this project. This committee should know that the Holy Cross Electric Association, with 1,900 members, serving Garfield, Pitkin, and Eagle Counties and a participating cooperative of the REA, has gone on record against it. Their statement of policy, adopted March 9 this year, is attached for your information. With your permission, I would like to read that.

STATEMENT OF POLICY

Holy Cross Electric Association, Inc., is a Colorado corporation financed through the Rural Electrification Administration, was organized in 1939 and serves about 1,900 consumers on the western slope of the Continental Divide, in the State of Colorado. This association is indebted to the United States, and its consumers are grateful for the financing which has made possible the provision of electric service to a large area previously without electrification. Nevertheless, the association considers itself as a borrower and not as a donee of public funds. All interest and principal due have been paid in full.

The association is a member of the Colorado State Association of REA Cooperatives. It has come to the attention of this association that said Colorado State

association, and the National Rural Electric Cooperative Association, are seeking congressional approval of the Fryingpan-Arkansas and upper Colorado River projects, and that such groups assert that they are thereby representing all the rural electric cooperatives included within their organizations.

In such activity this association is not represented by such groups. Holy Cross Electric Association stands squarely against the Fryingpan-Arkansas project, but freely concedes it is not sufficiently informed, at this time, to take a position on the upper Colorado River project, which presents a more complex problem.

This association obviously has no quarrel with the principle that public funds may properly be used for public purposes to the public benefit, but contends that each proposal must be considered upon its own merits. This association understands the vital importance of water in the West, agrees that there exists no moral right to demand that waterflow uselessly through any given area when it could be better used elsewhere, has no objection to transmountain diversion of water where such is to the general public interest, and is more than willing to purchase electric energy at lower rates from any newly available source of power.

However, this association objects to the expenditure of public money to divert water from one area to another, when no additional benefit to the general public is thereby provided. All water from the Fryingpan and Roaring Fork Rivers can and will be used as efficiently and productively in its natural area as in the area to which it is sought to be diverted at a cost of many millions of dollars. The facts do not justify the Fryingpan-Arkansas project. Those who will pass upon this proposal are urged to independently investigate the facts, and to base their decision upon such facts.

The members and consumers of this association are users of water in 3 of the 7 Colorado counties which comprise the Colorado River Water Conservation District, the board of directors of which, on November 6, 1954, urged the consideration of the Fryingpan-Arkansis project be delayed until the Colorado River Storage project is authorized and constructed.

This statement is made and distributed upon the authority, and at the instruction, of the board of directors of Holy Cross Electric Association, Inc., given at a meeting of said board, held at Glenwood Springs, Colo., on March 9, 1955.

GLEN H. MOORE,
President of Holy Cross Electric Association, Inc.

Mr. GERBAZ. Several people have referred to the fact that there is no opposition to this project, especially over on the Senate side. Gentlemen, the reason you have not heard much from the opposition is that we haven't got the money to fight this and make a loud noise about it like the Arkansas Valley people. We weren't able to sell $75,000 worth of gold frying pans to raise the funds to fight this thing, the way they did.

We have a clipping out of Life magazine of March 18 illustrating that—the raising of the funds.

Mr. ASPINALL. Do you wish that made a part of the file, Mr. Gerbaz?

Mr. GERBAZ. Yes.

Mr. ASPINALL. Without objection, it will be made a part of the file.

(The article referred to will be found in the files of the committee.)

Mr. GERBAZ. There are already so many claims on our western slope water that I doubt if there is any water left for this project. Highline Canal Co. has adjudicated potential rights of 30,000 acre-feet on the Fryingpan that have never been mentioned to this committee—Mr. Stapleton will tell you about them in a few minutes. Twin Lakes has adjudicated rights of 52,000 acre-feet. The people downstream have senior rights, which explains why you haven't heard any complaints from them. When you get all through, there won't be any water for us, and there won't be any water for this project. In fact, last year, with less than full rights being asserted by Twin Lakes or Highline, there wasn't 20,000 acre-feet left for this project out of the

Fryingpan. That is less than a third of what the project will need to work.

The history of our water on the western slope has been to take a little at a time until we are now faced with overlapping claims that threaten to dry us up. Twin Lakes started out modestly in 1934, wanting only floodwaters. A few years later they worked that around to a decree for direct flow. They havn't been able to use their full rights because they didn't have money to build the storage. But this project will give them not only water, but storage so they can take more water. Already they are preparing to take this extra water. They are planning to sell 10,000 acre-feet to Colorado Springs. They have been offered $3,500,000 but they want more. See story from Grand Junction Sentinel, January 27, 1955, attached. I would like to submit this to the committee.

Mr. ASPINALL. Without objection, it will be made a part of the committee file.

(The article referred to will be found in the files of the committee.)

Mr. GERBAZ. Incidentally, this 10,000 acre-feet just happens to equal the amount that the Air Force is going to use at Colorado Springs. On April 19 of this year, Twin Lakes Co. asked the Colorado River Conservation District Board, of which I am a member, if we would oppose the sale of water for domestic instead of irrigation purposes. By way of explanation, they can't sell water to Colorado Springs if they don't get replacement irrigation water from Fryingpan-Arkansas. So Twin Lakes will come out pretty well with this project. They haven't done so badly in the past—the RFC lost a million dollars when it disposed of the Twin Lakes mortgage in 1953. The details of this are set forth in the RFC letter attached. I would like to make that letter a part of the record.

Mr. ASPINALL. Without objection, the letter will be made a part of the record.

(The letter referred to follows:)

RECONSTRUCTION FINANCE CORPORATION,
Washington, D. C., March 2, 1955.

Re Twin Lakes Reservoir & Canal Co., Ordway, Colo., docket number reference 1012.

PITKIN COUNTY WATER PROTECTION ASSOCIATION,
Aspen, Colo.

(Attention: L. D. Chalfant, President.)

GENTLEMEN: Reference is made to your letter of February 24, 1955, to Mr. Robbins, requesting information regarding the financial assistance rendered the Twin Lakes Reservoir & Canal Co. by the Reconstruction Finance Corporation.

Our files indicate that this Corporation in the early 1930's made loans aggregating $2,210,000 to the above-captioned company to finance construction work to increase the supply of water for irrigation of the lands served by the company. The securities issued to evidence these loans were scheduled to mature serially each year from 1938 to 1963, inclusive. This Corporation made additional advances in 1939, totaling $50,000. These funds were used for other improvement purposes and for the retirement of other indebtedness.

Refinancing of the indebtedness of the Twin Lakes Reservoir & Canal Co. became desirable subsequently, and in 1947 the existing bonded indebtedness of the company, in the amount of $2,200,000, was refinanced by the exchange of the securities then outstanding, for a new issue of 4 percent refunding bonds in the principal amount of $1,500,000, scheduled to mature serially through 1984, and 35,000 shares of special non-interest-bearing stock.

Legislation enacted by Congress in 1953 directed the liquidation of the Reconstruction Finance Corporation and the securities of the Twin Lakes Reservoir

& Canal Co., as well as the other security holdings, were made available for sale and circularized extensively to investment dealers and other possible purchasers, late in 1953. The best bid for the securities of the Twin Lakes Reservoir & Canal Co. was received from Boettcher & Co. of Denver. Consequently, the $1,348,000 principal amount of 4 percent refunding bonds remaining and the 35,000 shares of special stock were sold to Boettcher & Co. on February 19, 1954, for the sum of $1,247,760 plus accrued interest at 4 percent on the $1,348,000 of bonds from November 1, 1953, to the date of payment.

We trust that this information answers your inquiry.

Very truly yours,

R. A. BERGSTROM,

Chief, Public Agency Division, Office of Loan Administration and Liquidation.

Mr. GERBAZ. Now this power they are going to generate on the east slope seems doubtful too. If they have many years like last year, they won't have water to run the powerplants and that will run the cost up so they can't sell the power or retire the cost of this project the way they claim. At the plant cost of 6 mills, this power is already twice what I understand would be the cost of steam power. Lord knows, we have plenty of coal in Colorado, if power is what they need.

There are some mechanical questions about this project, too, that the committee might want to look into a little further. I am no engineer and would hate to pass judgment, but I would think they might have trouble with their open-ditch system on both sides of the Continental Divide. Last Saturday I had an aerial photographer friend take some pictures of the diversion area which I would like you gentlemen to see. I think these pictures will raise some questions in your minds too as to whether the open-ditch system will work.

Mr. ASPINALL. I did not understand your request. Do you wish these made a part of the file?

Mr. OLSON. They are just for the information of the committee.

Mr. ASPINALL. They will be made a part of the file.

(The pictures referred to will be found in the files of the committee.)

Mr. GERBAZ. Oscar Chapman in his report of June 18, 1953, page 92, said there wasn't any irrigation in the diversion area. Between Glenwood Springs and the Continental Divide and the Roaring Fork Valley there are thousands of acres of good farmland under irrigation—including Gerbaz ranch.

This project will seriously hurt us in the diversion area. It is doubtful if it will ever furnish the water or the power claimed because the water just isn't there. And the cost is a fantastic burden on the taxpayers in the rest of the United States. If they understood it like you gentlemen do, I am sure they would be up in arms.

I understand that over in the Senate there were some pious statements made that this wasn't an entering wedge for a bigger project. This committee might be interested in knowing that Secretary McKay put out a publication in February 1954 which says at page 112—I have the publication here [displaying]——

In addition to the Fryingpan-Arkansas projects diversions, the ultimate development plan for the Gunnison-Arkansas project would include diversions from Crystal River and Difficult, Castle, and Maroon Creeks, all of which are tributaries to Roaring Fork.

You can see why we are nervous about their statements that this is not an entering wedge. Also, you have been told that no new acres would be put under irrigation by this project. The Colorado Rural Electric News for April 1955 sets forth a map of the Arkansas Valley

showing how thousands of new irrigable acres will bloom if the Fryingpan-Arkansas project is built. I am enclosing that map for your information. This same publication, by the way, says that the REA's are unanimously in favor of the project, which is not true as the Holy Cross REA, with 1,900 members, is very much opposed.

People better equipped to talk about these broad aspects of the problem have done a pretty good job—Raymond Moley put out a book, "What Price Federal Reclamation," this year in which he severely criticizes this project. I am not equipped to talk about the broad aspects of this project. However, Raymond Moley and his organization make some very critical observations about Fryingpan-Arkansas in a pamphlet just released entitled "What Price Federal Reclamation."

If there are any local aspects any of you wish to inquire about, I will be glad to answer questions.

Mr. ASPINALL. Thank you very much. If you will just remain at the witness table there while we have the next witness.

STATEMENT OF WILLIAM STAPLETON, COUNTY CLERK AND RECORDER OF PITKIN COUNTY, COLO.

Mr. STAPLETON. Mr. Chairman, my name is William Stapleton. I have been a miner, farmer, and at present the county clerk and recorder of Pitkin County. I reside at Aspen, Colo, and have lived there 47 years.

I want to bring to the attention of this committee the existence of prior decrees on Fryingpan-Arkansas waters which apparently have never been considered in connection with this project.

These prior rights are now held by the Highline Canal Co. of Rocky Ford, Colo. The priorities date from 1921 and the rights were made absolute August 30, 1927. The Highline Canal Co. is entitled to a priority of 180 cubic feet of water per second of time from the headwaters of the Fryingpan. This is done by a series of collection ditches, reservoir and tunnel to the east slope of Colorado. If you take 180 cubic feet per second out of the headwaters of the Fryingpan, there is nothing left for this project. This is a potential of around 32,000 acre-feet per year. But, of course, there wouldn't be that much water available. So that the committee can have this properly checked, I am submitting herewith copies of the three decrees and of the related ditch maps.

Mr. ASPINALL. What is your wish with regard to them?

Mr. OLSON. We do not expect them to be made a part of the record but to be available to the committee.

Mr. ASPINALL. They will be accepted as part of the file.

Mr. HOSMER. Mr. Chairman, may I inquire if they are court decrees there with the map.

Mr. OLSON. Yes, sir; there are three court decrees and the related ditch maps.

Mr. HOSMER. It would seem to me the court decrees might be made a part of the record rather than the file.

Mr. ASPINALL. Do you make that request?

Mr. HOSMER. I ask unanimous consent the decrees be made a part of the record.

Mr. ASPINALL. Unanimous consent request has been made that the decrees be made a part of the record at this point in Mr. Stapleton's statement.

Hearing no objection, it is so ordered, and the maps will be made a part of the file.

(The court decrees referred to follow, and the maps will be found in the files of the committee.)

EXHIBIT No. 1

IN THE DISTRICT COURT OF THE NINTH JUDICIAL DISTRICT OF THE STATE OF COLORADO IN AND FOR GARFIELD COUNTY

In the Matter of the Priority of Water Rights in Water District No. 38 of the State of Colorado: and in the Matter of the Petition of A. E. Carlton for a Decree to Ivanhoe Reservoir and Tunnel, Lyle, Pan, and Hidden Lake Creek Ditches

DECREE

Now on this 9th day of January A. D. 1928, the same being one of the regular judicial days of the November Term, A. D. 1927, of our said District Court, the above entitled matter comes on regularly for hearing on the petition of A. E. Carlton and the objections and protests thereto on file herein, all in pursuance of the order made and entered herein on October 27, 1927, fixing the time for this hearing and prescribing the notice thereof to be given to all persons interested adversely to the said petitioner herein: The said petitioner appeared herein by his attorneys C. W. Taylor Esq. and H. R. Waldo Esq. and the Koch Lumber Company, one of the protestants herein, appeared by its attorney, W. R. Shaw Esq.; and no other person or corporation appeared in opposition to petitioner or otherwise, and the time allowed therefor has now expired. Thereupon the said petitioner offered evidence in open court in support of the rights and claims made by him herein and the said The Koch Lumber Company offered its evidence in support of its protest and of the rights and claims made by him herein; and the court, having heard and considered the same and the argument of counsel thereon and being well and fully advised in the premises, doth now find with reference to the rights and claims of said petitioner herein:

1. That at all times before this day the said petitioner herein has failed to offer any evidence in any of the proceedings heretofore had in this court in the matter of the Priority of Water Rights in Water District No. 38 of the State of Colorado, in support of the rights now claimed by him as fully set forth in his petition herein.

2. That before giving or offering any evidence herein and before filing his said petition, the said petitioner made and filed in this court his statement of claim in form and substance as required by the laws of the State of Colorado in such case made and provided, setting forth his rights and claims in and to the waters in said Water District No. 38 which are here involved, a true copy of which statement of claim appears as a part of the said petition herein.

3. That before giving and offering any evidence herein, the said petitioner duly procured leave of this Court so to do on terms as to notice to all parties interested adversely thereto more fully specified in the said order of this Court made and entered herein on October 27, 1927, all as is required by the said laws of the State of Colorado.

4. That petitioner has caused due and sufficient notice of his claim, and of the time and place fixed for the hearing thereon when any parties interested adversely thereto might appear and be heard in opposition thereto, to be given to all such parties interested adversely thereto in strict and complete accordance with the provisions of the said order herein of October 27, 1927; so that there is now vested in this court full and complete right and jurisdiction to adjudicate and determine the rights and priorities in said Water District No. 38 claimed by said petitioner.

5. That petitioner is a citizen and resident of the United States and of the State of Colorado; that petitioner is the successor in interest of L. G. Carlton in and to the works and rights hereinafter mentioned; that petitioner is now the owner of (a) the Hidden Lake Creek Ditch (b) the Pan Ditch (c) the Lyle Ditch (d) the Ivanhoe Reservoir, and (e) the Ivanhoe Tunnel, all situated

in Water District No. 38 of the State of Colorado and in Pitkin County, Colorado, and all hereinafter more particularly described and also more particularly shown by the general map of said ditches, reservoir, and tunnel on file as one of the petitioners exhibits herein and by the map and statement of the Hidden Lake Creek Ditch, the map and statement of the Pan Ditch, the map and statement of the Lyle Ditch, and the map and statement of the Ivanhoe Reservoir and Tunnel, all made by L. G. Carlton and duly filed as required by the laws of the State of Colorado in the office of the State Engineer of Colorado, and of all of which copies are likewise on file herein as exhibits in this proceeding; and that said ditches, reservoir, and tunnel, constitute a single system for the diversion of water from Hidden Lake Creek, Pan Creek, Lyle Creek, and Ivanhoe Creek, all tributaries of the Colorado River by the way of Roaring Fork River, Frying Pan Creek, and South Frying Pan Creek, into said Ivanhoe Reservoir, the storage of the same therein at times when storage is permissible, the transmission of the same there through during the entire irrigation season of each year, and the carriage of both the stored water and that derived from direct flow through the Continental Divide by means of said Ivanhoe Tunnel onto the Eastern Slope of said Continental Divide where the same is discharged at the east portal of said tunnel into Lake Fork Creek, a tributary of the Arkansas River, and later diverted from said streams and used in the irrigation of lands within the State of Colorado lying along said streams and susceptible of irrigation therefrom.

6. That the Hidden Lake Creek Ditch will divert water from Hidden Lake Creek, a tributary of Ivanhoe Creek, at or about a point on the east bank of said stream in the NE¼ SW¼ of Sec. 11 in Twp. 9 S. of R. 82 W. of the 6th P. M. from which the SE corner of Sec. 13 in said township and range bears S. 46°14′ E. 11,392.5 feet, will run thence in a southeasterly direction a distance of about 1.1 miles to said Ivanhoe Reservoir, and will have a carrying capacity when completed of 100 cubic feet of water per second of time; that the Pan Ditch will divert water from Pan Creek, a tributary of South Frying Pan Creek at or about a point on the north bank of said stream in the N. W. ¼ of NW¼ of Sec. 24 in Twp. 9 S. of R. 62 W. of the 6th P. M. from which the S. E. corner of Sec. 13 in said township and range bears N. 52° 14′ E. 2022.1 feet, will run thence in a northwesterly direction a distance of about 1.6 miles to said Ivanhoe Reservoir, and will have a carrying capacity when completed of 59 cubic feet of water per second of time; that the Lyle Ditch diverts water from Lyle Creek, a tributary of Ivanhoe Creek at or about a point on the southeast bank of said stream in the N.W.N.E¼ of Sec. 2 in Twp. 9 S. of R. 82 W. on the 6th P. M. from which the S. E. corner of Sec. 13 in the township and range aforesaid bears S. 23° 19′ E. 16,697.2 feet, runs from thence in a southeasterly direction a distance of about 2 miles to said Ivanhoe reservoir, and has a carrying capacity of 200 second feet of water per second of time; that the Ivanhoe Reservoir is formed by a dam approximately 21 feet high across the natural bed of Ivanhoe Creek, a tributary of Frying Pan Creek, and situated in the SE¼ SW¼ of Sec. 12 in Twp. 9 S. of R. 82 W. of the 6th P. M. with its northeasterly end located at or about a point from which the S. E. corner of Sec. 13 in the township and range aforesaid bears S. 26° 45′ E. 7021.3 feet, and by a bulkhead dam approximately 10 feet high at the upper end of said reservoir situated in the SE¼ NE¼ of Sec. 13 in the township and range aforesaid, and with its southerly end located at or about a point from which the NE corner of said Sec. 13 bears S. 8° 11′ E. 2739.2 feet, it overflows all or portions of the SE¼ SW¼ and SW¼ SE¼ of said Sec. 12 and the NE¼ NW¼ and NE¼ of said Sec. 13, has a capacity of 1200 acre feet or 52,273,000 cubic feet of water, and holds back and impounds all of the waters of said Ivanhoe Creek above said dam first above described and all of the waters carried or to be carried into it by said Hidden Lake Creek, Pan, and Lyle Ditches, and equalizes and carries the same into the said Ivanhoe Tunnel; that the Ivanhoe Tunnel has its westerly portal at or about a point from which the SE corner of said Sec. 13 bears S. 8° 11′ E. 2739.2 feet, runs from thence S. 54° 25′ E. a distance of approximately 9400 feet to its easterly portal in the NE¼ SW¼ of Sec. 20 in Twp. 9 S. of R. 81 W. of the 6th P. M. crosses in its course all or parts of the SE¼ NE¼ and NE¼ SE¼ of Sec. 13 in Twp. 9 S. of R. 82 W. of the 6th P. M. and the SW¼ and SW¼ SE¼ of Sec. 18, the NE¼ of Sec. 19 and the S½ NW¼ and N½ SW¼ of Sec. 20 all in Twp. 9 S. of R. 81 West of the 6th P. M. and is approximately 16 feet wide and 22 feet high and has a grade of approximately 14.1 feet per thousand feet; that water is carried through said Ivanhoe Tunnel by means of a pipeline and flume therein having a carrying capacity of 85 cubic feet of water per second of time to a point of discharge at

or about the easterly portal of said Ivanhoe Tunnel into Lake Fork Creek, a tributary of the Arkansas River; that said Ivanhoe Reservoir and Tunnel constitutes not only the works for the direct diversion and carriage of water from Ivanhoe Creek into said Lake Fork Creek but also a part of the works for the diversion into said Lake Fork Creek of the waters of Lyle Creek, Hidden Lake Creek and Pan Creek which are immediately diverted from said streams by the Lyle, Hidden Lake Creek, and Pan Ditches, respectively; and that, in addition thereto, said Ivanhoe Reservoir constitutes and is used as a storage reservoir for the storage water carried directly therein by the natural stream of said Ivanhoe Creek, of water from Lyle, Hidden Lake Creek, and Pan Creeks carried therein by means of said Lyle, Hidden Lake Creek, and Pan Ditches, respectively.

7. That work was commenced on the Ivanhoe Reservoir and Tunnel on June 27, 1921, on the Lyle Ditch on September 28, 1924, on the Pan Ditch on October 5, 1924, and on the Hidden Lake Creek Ditch on August 30, 1927; that since the commencement thereof as aforesaid work has been continued on all of said ditches, reservoir, and tunnel with all due and reasonable diligence; that the Lyle Ditch and Ivanhoe Reservoir and Tunnel are fully completed to the capacities heretofore set forth and are now in use, but said Pan and Hidden Lake Creek Ditches have not yet been completed or used that ever since the completion thereof as aforesaid the said Lyle Ditch and Ivanhoe Reservoir and Tunnel have been used in the diversion of the waters of Lyle Creek and Ivanhoe Creek into said Ivanhoe Reservoir for storage at all times when the storage of water is permitted by law and can be accomplished without infringement on the rights of other appropriators from said streams and the streams to which same are tributary, and water has been so stored in said reservoir up to the full capacity thereof and thereafter released at will therefrom and carried through said Ivanhoe Tunnel into said Lake Fork Creek; that in like manner ever since the completion thereof as aforesaid the said Lyle Ditch and Ivanhoe Reservoir and Tunnel have also been used in the direct diversion of the waters of Lyle Creek and Ivanhoe Creek into and throught said Ivanhoe Reservoir and Tunnel and thence into said Lake Fork Creek, and water has been so diverted and carried into said Lake Fork Creek during the entire irrigation season of each year since such completion of works to the extent of 35 cubic feet of water per second of time from Ivanhoe Creek whenever the same was obtainable therefrom and to the extent of 50 cubic feet of water per second of time from Lyle Creek whenever the same was obtainable therefrom, the total of which has been so taken as direct flow being limited to a total capacity of 85 cubic feet of water per second of time which is the capacity of works for carrying same through said Ivanhoe Tunnel; and that all of the water so diverted and discharged into said Lake Fork Creek, both stored water and direct flow, has been allowed to flow down the natural channel of said creek and of the Arkansas River and has been diverted therefrom, less losses in transit determined as provided by the laws of the State of Colorado, and beneficially used in the irrigation of lands within the State of Colorado lying along said stream and susceptible of irrigation therefrom but otherwise inadequately supplied with water for the proper irrigation thereof and the production of crops thereon.

8. That there are large bodies of land within the State of Colorado lying along said Arkansas River and susceptible of irrigation therefrom which are inadequately supplied with water from the normal flow of said streams, to-wit, more than 80,000 acres thereof; upon which all of the waters so diverted and to be diverted by petitioner as aforesaid has been and can be beneficially used in the irrigation thereof and the production of crops thereon, without allowing for any of said land a total water supply from all sources in excess of one cubic foot of water per second of time for each 50 acres thereof which is the duty of water heretofore fixed by this Court by its general adjudication decrees hereinafter mentioned; that there is unappropriated water in the said Colorado River and its tributaries in Water District No. 38 of the State of Colorado which is not required to satisfy the rights of the appropriators and users of water therefrom, while there is an annual shortage of water on said Arkansas River whereby the productivity of lands lying along said stream is seriously impaired through lack of sufficient water for the adequate irrigation thereof, so that the provision of the additional water for said lands made available by means of the works owned by the petitioner and built by him and his predecessors in interest as herein set forth will be highly beneficial and advantageous in the agricultural development of said lands within the State of Colorado and will result in no waste or other improper use of said water but rather in a highly beneficial and economic use thereof on lands within the State of Colo-

rado, requiring additional water for the proper use thereof; and that under and by virtue of the foregoing the said petitioner is entitled to the priorities and rights to divert, take and use water from the above named streams in Water District No. 38 of the State of Colorado hereinafter more particularly set forth *and* decreed herein.

It is, therefore, CONSIDERED, ORDERED, ADJUDGED, and DECREED by this court, as follows;

1. That the said Ivanhoe Reservoir as a storage reservoir is entitled to and is hereby awarded No. 14 and Reservoir priority number 14 in water district No. 38 of the State of Colorado, with date of priority of June 27, 1921, as to water from Ivanhoe Creek, of September 28, 1924, as to water from Lyle Creek of October 5, 1924, as to water that may hereafter be brought therein from Pan Creek, and of August 30, 1927 as to water that may hereafter be brought therein from Hidden Lake Creek; and that by virtue thereof there be allowed to flow into said Ivanhoe Reservoir from Ivanhoe Creek up to the entire flow thereof, and from the other sources of supply hereinabove described up to the capacities of the respective supply ditches therefrom as hereinabove specified in reference to the completed Lyle Ditch and to the capacities to which same may hereafter be completed with due and reasonable diligence, not exceeding the maximum capacities herein specified, in reference to the Pan and Hidden Lake Creek ditches, at all times when the diversion of water from said streams for storage purposes is permitted by law and can be made without infringement on the rights and appropriations of other appropriators from said stream hereinabove mentioned or the streams to which they are tributary, but all only to the extent necessary to fill and keep said reservoir filled to its capacity hereinabove specified up to the time in each year when the storage of water from said streams is no longer permissible under the law or will infringe the rights of other appropriators, and with the right in petitioner and his heirs and assigns to at will release said water so stored and carry the same into said Lake Fork Creek and thereafter divert the same therefrom or from the Arkansas River, less losses in transit to be determined as provided by the laws of the State of Colorado, and to use or permit the use of the same in the irrigation of lands in the State of Colorado lying along said streams and susceptible of irrigation therefrom.

2. That the said Ivanhoe Reservoir and Tunnel as a ditch system for diverting water as direct flow from said Ivanhoe Creek and carrying same into said Lake Fork Creek is entitled to No. 171 and priority No. 246 in water district No. 38 of the State of Colorado, with date of priority of June 27, 1921; and that by virtue thereof there be allowed to flow into and through the said ivanhoe Reservoir and Tunnel during the irrigation season of each year, 35 cubic feet of water per second of time from said Ivanhoe Creek, with the right in petitioner and his heirs and assigns to discharge same into said Lake Fork Creek and thence into the Arkansas River, and thereafter divert the same therefrom, less losses in transit to be determined as provided by the laws of the State of Colorado, and to use to permit the use of the same in the irrigation of lands in the State of Colorado lying along said streams and susceptible of irrigation therefrom.

3. That the said Lyle Ditch in connection with said Ivanhoe Reservoir and Tunnel used as a ditch system for diverting water as direct flow from said Lyle Creek and carrying same into said Lake Fork Creek is entitled to No. 172 and priority No. 247 in water district No. 38 of the State of Colorado, with date of priority of September 28, 1924; and that by virtue thereof there be allowed to flow into and through said Lyle Ditch and Ivanhoe Reservoir and Tunnel, during the entire irrigation season of each year, 50 cubic feet of water per second of time from said Lyle Creek, with the right in petitioner and his heirs and assigns to discharge same into said Lake Fork Creek and thence into the Arkansas River, and thereafter divert the same therefrom, less losses in transit to be determined as provided by the Laws of the State of Colorado, and to use or permit the use of the same in the irrigation of lands in the State of Colorado lying along said streams and susceptible of irrigation therefrom.

4. That the said Pan Ditch in connection with said Ivanhoe Reservoir and Tunnel used as a ditch system for diverting water from said Pan Creek and carrying same into said Lake Fork Creek is entitled to No. 173 and conditional Priority No. 248 in Water District No. 38 of the State of Colorado, with date of priority of October 5, 1924, and the Hidden Lake Creek Ditch in connection with said Ivanhoe Reservoir and Tunnel used as a ditch system for diverting water as a direct flow from said Hidden Lake Creek and carrying same into said Lake Fork Creek is entitled to No. 174 and conditional priority No. 249 in Water

District No. 38 of the State of Colorado, with date of priority of August 30, 1927; that by virtue thereof there shall be allowed to flow into and through said Pan Ditch and Ivanhoe Reservoir and Tunnel, during the entire irrigation season of each year, such amount of water from Pan Creek as the same may hereafter with due and reasonable diligence be constructed and enlarged to carry up to a maximum of 50 cubic feet of water per second of time, and into and through said Hidden Lake Creek Ditch and Ivanhoe Reservoir and Tunnel, during the entire irrigation season of each year such amount of water from Hidden Lake Creek as the same may hereafter with due and reasonable diligence be constructed and enlarged to carry up to a maximum of 100 cubic feet of water per second of time, with the right in both cases in petitioner and his heirs and assigns to discharge same into said Lake Fork Creek and thence into the Arkansas River, and thereafter divert the same therefrom, less losses in transit to be determined as provided by the laws of the State of Colorado, and to use or permit the use of the same in the irrigation of lands in the State of Colorado lying along said streams and susceptible of irrigation therefrom; that all of the rights herein decreed in and to waters from said Pan and Hidden Lake Creeks are conditional upon the completion of the necessary works for the diversion thereof and upon the making of beneficial use thereof, both with all due and reasonable diligence, and are limited to the capacities to which said works shall be so completed and such beneficial use made not exceeding the maximum amounts hereinabove specified; that due proof of such completion of works and the beneficial use of such water shall be made to this Court as provided by law before a final decree therefor shall be made herein; and that for such purpose this cause shall stand continued on the records of this Court but omitted from the docket thereof until such time as may be fixed by order of this Court herein on proper application therefor when petitioner or his heirs or assigns may appear and make such proof after having given such notice of said hearing to parties interested adversely thereto as the Court may prescribe in its order fixing the date thereof.

5. That this decree shall be absolute and final as to the waters herein permitted to be diverted and taken from said Lyle Creek and Ivanhoe Creek and conditional only as to the waters to be diverted and taken from Pan Creek and Hidden Lake Creek; and that petitioner is the owner of all of said rights and priorities herein decreed and he and his heirs and assigns shall be entitled to divert, store, take, and use or permit the use of said waters all as is herein decreed and with priorities as hereinabove specified.

6. That all of the rights and priorities herein fixed and determined shall be subject to all prior appropriations of water from said streams and the streams to which they are tributary and to all the decrees of this Court adjudicating rights and priorities in said Water District No. 38 made and entered more than four years prior to the 27th day of October, A. D. 1927, the date of the filing of the petition herein; that these findings and this decree shall be subject to the same general conditions and provisions as are contained in the general decree of this Court made and entered on the 11th day of May, A. D. 1889, "In the matter of the adjudication of rights to the use of water for irrigation in Water District No. 38" in so far as the same are applicable thereto; that petitioner shall at his own expense install and maintain such adequate and standard wiers, gauges, and other measuring devices as may be necessary to enable the provisions of this decree to be properly enforced in the manner provided by the laws of the State of Colorado; and that under no circumstances shall water taken hereunder be used in the irrigation of land, either solely or in conjunction with other water, to an extent which will allow a supply to such land from all sources in a larger quantity than in the ratio of one cubic foot of water per second of time for each fifty acres of land irrigated.

7. That petitioner shall pay all the costs of this proceeding to be taxed against him herein.

Done in open Court.
By the Court

JOHN T. SHUMATE, *Judge.*

STATE OF COLORADO,
County of Garfield, ss:

I, D. W. Shores, Clerk of the District Court of the Ninth Judicial District of the State of Colorado, Within and for the County of Garfield, in said State do hereby certify the above and foregoing to be a full, true and complete copy of the Decree made and entered in the above entitled cause on the Ninth day of January, 1928, the same being entitled; In the Matter of the Priority of Water

Rights in Water District No. 38 of the State of Colorado: and in the Matter of the Petition of A. E. Carlton for a Decree to Ivanhoe Reservoir and Tunnel, Lyle, Pan, and Hidden Lake Creek Ditches.
as the same now appears of record in the office of the Clerk of the District Court of said Garfield County.

WITNESS my hand and the Seal of the Court at the Court House in Glenwood Springs, in said County, this 26th day of April A. D. 1928.

[SEAL] D. W. SHORES,
Clerk of the District Court of Garfield County, Colorado.

Filed for record this 23rd day of January, A. D. 1932 at 1:30 P. M. M. M. Neihardt, Recorder.

STATE OF COLORADO,
County of Pitkin, ss:

I, Wm C. Stapleton, county clerk and recorder in and for said county and State do hereby certify that the foregoing is a full, perfect and complete copy of Water Decree as the same appears of Record in my office in book 162 at pages 279 to 281 inclusive.

Witness my hand and official seal this 25th day of April A. D. 1955.

[SEAL] WM. C. STAPLETON,
County Clerk.

EXHIBIT No. 2

HIDDEN LAKE CREEK DITCH, No. 174

That said Hidden Lake Creek ditch is No. 174. Under former decrees of this court it has been awarded the following priorities, to wit:

In and by decree entered in said court on the 9th day of January 1928 in case No. 2621, conditional decree No. 174 for 100 cubic feet of water per second of time as of date August 30, 1927, conditioned upon the completion of said ditch and the beneficial application of water therefrom with reasonable diligence.

In and by decree entered in this court on the 2d day of August 1936 in case No. 3082, priority No. 249 for 50 cubic feet of water per second of time, absolute, as of date August 30, 1927, and continued as a conditional decree for further proof of the completion of said ditch and the beneficial application of water therefrom in an additional amount, with reasonable diligence.

That since the entry of the foregoing decrees the construction of said ditch has been completed with reasonable diligence to the carrying capacity of 70 cubic feet of water per second of time, and beneficial application of water therefrom has been made to the extent and in the amount of 20 cubic feet of water per second of time, in addition to the 50 cubic feet of water per second of time heretofore awarded said ditch, as hereinabove set forth. That said decree should be made absolute to the amount of 70 cubic feet of water per second of time of date August 30, 1927.

That the claimant of said ditch is the High Line Canal Co., a Colorado corporation, whose post office address is Rocky Ford, Colo., as successor in interest and title to the former claimants of said ditch and water rights.

That the findings of this court contained and set forth in said decrees in said cases Nos. 2621 and 3082 hereinabove referred to are adopted and confirmed as herein modified and amended.

Wherefore, it is ordered, adjudged, and decreed that said Hidden Lake Creek ditch be, and it is hereby, awarded priority No. 249 for 20 cubic feet of water per second of time as of date August 30, 1927.

It is further ordered, adjudged, and decreed that upon motion of counsel for claimant the conditional portion of said decrees not heretofore or not herein made absolute be and the same is hereby canceled.

STATE OF COLORADO,
County of Garfield, ss:

I, Ian W. Bell, clerk of the District Court of the Ninth Judicial District of the State of Colorado within and for the county of Garfield, do hereby certify the above and foregoing to be a true, perfect, and complete copy of a decree entered of record.

In testimony whereof, I have hereunto set my hand and affixed the seal of said court, at my office in Glenwood Springs, Colo., this 19th day of April A. D. 1955.

[SEAL] IAN W. BELL, *Clerk.*

EXHIBIT No. 3

PAN DITCH No. 173

That said Pan Ditch is No. 173. Under former decrees of this court it has been awarded the following priorities, to wit: In and by a decree of this court entered on the 9th day of January A. D. 1928, in case No. 2621, a conditional decree No. 173 for 50 cubic feet of water per second of time as of date October 5, 1924, conditioned upon the completion of said ditch and the beneficial application of water therefrom with reasonable diligence.

In and by a decree of this court entered on the 25th day of August 1936, in case No. 3082, said conditional decree heretofore entered was continued for further proof as to the completion of said ditch and the beneficial application of water therefrom with reasonable diligence.

That since the entry of the foregoing decrees construction of said ditch has been completed with reasonable diligence to the carrying capacity of 25 cubic feet per second of time and beneficial application therefrom to the extent and in the amount of 25 cubic feet of water per second of time has been made, and that said decree should be absolute as to said 25 cubic feet of water per second of time as of date October 5, 1924.

That the claimant of said ditch is the High Line Canal Co., a Colorado corporation, whose post-office address is Rocky Ford, Colo., as successor in interest and title to the former claimants of said ditch and water rights.

That the findings of this court contained in and set forth in said decrees in said cases Nos. 2621 and 3082 hereinabove referred to, are adopted and confirmed herein except as herein modified or amended.

Wherefore, it is ordered, adjudged and decreed, That said Pan Ditch be and it is hereby awarded Priority No: 248 for 25 cubic feet of water per second of time as of date of October 5, 1924.

It is further ordered, adjudged and decreed, That upon motion of counsel for claimant the conditional portion of said decrees not heretofore or not herein made absolute be and the same is hereby canceled.

STATE OF COLORADO,
County of Garfield, ss.

I, Ian W. Bell, clerk of the district court, of the Ninth Judicial District of the State of Colorado within and for the County of Garfield, do hereby certify the above and foregoing to be a true, perfect, and complete copy of a decree entered of record.

In testimony whereof, I have hereunto set my hand and affixed the seal of said court, at my office in Glenwood Springs, Colo., this 19th day of April A. D., 1955.

[SEAL] IAN W. BELL,
Clerk.

Mr. STAPLETON. You will note that the reservoir priority decree takes the complete flow of Ivanhoe Creek.

If Twin Lakes takes 52,000 acre-feet out of the Roaring Fork, that will drain it dry. Added to the Highline Canal Co. rights, no water remains for this project from either the Fryingpan or the Roaring Fork Rivers.

It may be that the Bureau of Reclamation has found some way around this, but we have never seen any reference to the problem in any of the hearings, or in the reports from the Interior Department. We think this committee ought to have the matter carefully checked before going further. We are not water experts, but we live in the diversion area and we know there is a limit to the available water in that area. We also know that the Highline Canal Co. and Twin Lakes rights fully take up and hold superior rights to all the headwaters of the Roaring Fork and Fryingpan Rivers. Maybe the Government plans to buy up these rights, but so far we have heard nothing about it. It would seem this is the sort of thing that should be taken care of before the project is authorized. With Colorado

Springs offering $3,500,000 for the 10,000 acre-feet of water, these rights might come pretty high.

As a matter of considerable interest to Pitkin County, the Highline Canal Co. has recently been ruled as nonassessable for tax purposes, which means that they have taken $13—off the tax rolls of our county. We are not only losing water, but are losing taxes, too.

Mr. ASPINALL. Does that conclude your statement?

Mr. STAPLETON. It does.

Mr. ASPINALL. Thank you very much.

We will now have the statement of Mr. Stewart.

STATEMENT OF CLINTON B. STEWART, ATTORNEY, ASPEN, COLO.

Mr. STEWART. Mr. Chairman, my name is Clinton B. Stewart. I am an attorney practicing at Aspen, Colo. I represent the city of Aspen, the chamber of commerce, and the Holy Cross Electric Association, for the purposes of this committee.

The reports of the Bureau of Reclamation and the proponents of the Fryingpan-Arkansas project have computed the repayment cost of the construction at 100 percent of parity. However, under H. R. 412, the Director of the Bureau of Reclamation is empowered to reduce rates to be charged to all consumers considering their ability to pay. Should the Director enter into contracts reducing rates, then all of this maze of figures pertaining to repayment is meaningless. Because of this, I feel that all data relating to reimbursement does not even deserve consideration by this committee where it is asserted to justify the construction of the project.

Next, I question that there is sufficient water in the diversion areas to export the 84,100 acre-feet that would be needed to make this project possible. Hydroelectric plants require a continuous direct flow of water. I understand that last year (1954) there would have been available only about 19,000 acre-feet of water from the Fryingpan to export under this project. I know that there are huge storage reservoirs to be constructed on the eastern slope to level off the flow between years of heavy precipitation and low precipitation; however, if feasibility is to be based upon the opportunity to export 69,000 acre-feet of the Fryingpan and an additional 15,000 through Twin Lakes, then I feel it is necessary to know with certainty that there will be in fact sufficient water for exportation after deducting water presently used, reserved for the future development of the western slope, our proportionate share of the commitment at Lee Ferry and of the Mexican Treaty. Here then we should consider that the quantity and quality of the water remain adequate.

At this point I would like to have a letter written by John Barnard, a prominent Colorado water authority, filed with the record of this committee, which is attached as exhibit 1 to my statement and perhaps could become a part of the record rather than being filed.

This letter outlines in detail his previous objections made before the House Subcommittee on Interior and Insular Affairs. The letter was written March 21, 1955 and addressed to Fred McLaughlin, a State representative from the Fryingpan area. He particularly objected to the diversion of water until it is proven by adequate evidence as to the amount of water available on the western slope and the amount thereof that may be called surplus water. To my knowledge, this has

not been adequately shown except by mere assumption. I should like to read just a short portion of that letter.

When we appeared before this committee in June 1953 we made certain objections. Among others I find the following in my own statement:

"Third. I want to outline specifically our objections, the positions we take, and our contentins in connection with this proposed project. And that in a few words is this:

"We are unalterably opposed to this or any other transmountain diversion of the waters of the upper Colorado River until these are accomplished:

"First. A complete survey of the water supply in the Colorado River Basin is made, and a dependable inventory of water resources therein is compiled and promulgated by an unprejudiced agency. The word "unprejudiced" is included because, speaking personally and for myself, I do not consider the Bureau of Reclamation an unprejudiced agency.

"Second. A complete survey and analysis also by an unbiased and unprejudiced agency is made showing in detail the present and all future requirements for water on the western slope for all beneficial purposes, including agricultural, industrial, municipal, and domestic purposes.

"Third. Upon definitely ascertaining the amount of water, if any, shown by these reports to be available for exportation from the western slope, any transmountain diversion project, including these here under discussion is proved to be feasible, practicable, and economically sound."

Again I said:

"There is not at hand sufficient dependable information as to the amount of water which can be called surplus and thus available for transmountain diversion from the headwaters of the Colorado River or any of its tributaries to justify favorable action by this committee."

If this committee is going to act on this measure, the proponents should prove not only that there is water available but, also, that it is available in the diversion area.

Now I would like to inquire into the matter of return flow as it relates to the Aspen Reservoir. This reservoir is to provide replacement water. In the Roaring Fork Valley from Aspen to the Fryingpan, the return flow runs as high as 80 percent of the initial amount of water used to irrigate the land. Only 20 percent is consumed in irrigation and the return flow is then available for continued and repeated use below. The Aspen Reservoir is supposed to store 28,000 acre-feet of water, yet the amount of water exported is to run about 84,000 acre-feet. The replacement water to be made available should at least be twice the amount diverted in order that the return flow lost lost through exportation may be made available to users below. You must remember that for each acre of water that is exported, the western slope loses not only the single acre-foot, but also the benefit of the return flow which would be much more than 1 acre-foot.

The loss of this return flow might require that prior appropriations below the diversion area and other Colorado River commitments could cause the headgates on this diversion to be closed. Is it known, after July 1 of the average year, whether or not the loss of this return flow would still leave sufficient water in the diversion watershed to satisfy all prior commitments of the western slope?

Now, Colorado is not united in its approval of this project. This has been shown by the testimony of Mr. Gerbaz. The Colorado River Conservation District, by its resolution of November 6, 1954, effectively repudiated it. The Holy Cross Electric Association (REA) opposes it. Pitkin County and the city of Aspen oppose it. The commissioners of the western slope oppose it.

This committee should realize that the concept of reclamation on the western slope is changing. Now industrial potential is rapidly developing in the upper Colorado River Basin—uranium mining and processing, oil shale likewise, oil field development, et cetera. The vast coal field found along the Colorado River Valley in Garfield County could make available huge electric generating plants and could produce electricity probably at 3 or 4 mills as compared with 6 mills from the hydro plants under H. R. 412. Union Oil is committed to build a $5 million pilot plant to process oil shale near Grand Valley, Colo. All of these will make new demands for industrial and domestic water out of the Colorado River.

Next I would like to question whether this committee has adequately inquired into the matter of storage facilities in the upper reaches of the Arkansas? Does this make available aditional water in the Arkansas Valley? If it does, what is the benefit? Is the evaporation loss of the Pueblo Reservoir justified considering the depth and surface area exposure? Is it known whether all individual appropriators will turn their rights over to the Pueblo Reservoir? If they are not unanimous, is it known how this project will be affected by those refusing to go under the program? Will their demands on the water flowing into the reservoir adequately allow for its efficient use.

It has been indicated that the only water that this reclamation project wants, is surplus flood waters. I want this committee to understand that there are only two basic types of decrees in Colorado. One is a direct flow which is limited by prior senior decrees. The next is a storage decree which allows storage of the amount called for by the decree annually and not necessarily to store indefinitely. Neither type of decree refers to flood water, but rather the appropriations under this project as far as western Colorado is concerned is a direct flow decree. This means that the water asked for, is not in fact flood waters but comes from the general mass. It would be limited to "flood waters" only if these flood waters are the only source available at the point of diversion.

Next, reference is made to the recommended flow to be maintained on the Fryingpan for fish and recreational values. This establishes minimum flow figures for the regulation of the Fryingpan River. The gaging station is a Norrie above the junction of the North Fork with the Fryingpan. The minimum recommended flow is 30 cubic feet per second. I would like to refer the committee to Geological Survey Water Supply Paper 1313 (p. 111), which indicates the flow figures at this gaging station. From October to March there would rarely be any water available for exportation since during many of these months there would be less than the recommended minimum available. Also, as I would interpret these figures, it seems questionable in my mind that there would be water available many times after July during some years. This means that the diversion must collect its water from April through July for a dependable supply.

In checking the flow figures in acre-feet for the year 1948 for the months of April, May, June, and July, you will find that there is 81,650 acre-feet that flowed by the gaging station at Norrie. Then by deducting 36,800 acre-feet that this project would allow to flow for recreational uses there would then be available only 44,850 acre-

feet for diversion assuming the project could pick this up. I have chosen this as a more or less average year. Under this project the recommended minimum flow past Norrie would account for about 57,040 acre-feet of water. Using the Geological Survey figures on page 111 referred to above would indicate that more than half of the time there would be less than 69,000 acre-feet of water that could leave the Fryingpan. The rest of this would then have to come from the Roaring Fork and allowing for the full adjudication of the Twin Lakes which would be a senior right, I question not only the available supply, but also wonder if there would be enough water to maintain the supplemental supply in the Aspen Reservoir.

I want to thank the committee for this opportunity to speak for the western slope and solicit your serious consideration of the questions raised herein.

Mr. ASPINWALL. Without objection, the letter of Mr. Barnard attached to Mr. Stewart's statement will be made a part of the record at this point.

Hearing no objection, it is so ordered.

(The letter referred to follows:)

GRANBY, COLO., *March 31, 1955.*

Mr. FRED MCLAUGHLIN,
Sherman Plaza Apartments, Denver, Colo.

DEAR FRED: This letter has reference to the Fryingpan-Arkansas project, and the following is written in line with our telephone conversation yesterday. I understand that you are to appear before the House Committee on Interior and Insular Affairs, Irrigation Subcommittee, at the forthcoming hearings on this project. These hearings are more or less supplemental, and, as I understand the Committee rules, only new and supplemental information will be heard.

When we appeared before this committee in June 1953 we made certain objections. Among others I find the following in my own statement:

"Third. I want to outline specifically our objections, the positions we take, and our contentions in connection with this proposed project. And that in few words is this:

"We are unalterably opposed to this or any other transmountain diversion of the waters of the upper Colorado River until these are accomplished:

"First. A complete survey of the water supply in the Colorado River Basin is made, and a dependable inventory of water resources therein is compiled and promulgated by an unprejudiced agency. The word 'unprejudiced' is included because, speaking personally and for myself, I do not consider the Bureau of Reclamation an unprejudiced agency.

"Second. A complete survey and analysis also by an unbiased and unprejudiced agency is made showing in detail the present and all future requirements for water on the western slope for all beneficial purposes, including agricultural, industrial, municipal, and domestic purposes.

"Third. Upon definitely ascertaining the amount of water, if any, shown by these reports to be available for exportation from the western slope, any transmountain diversion project, including those here under discussion is proved to be feasible, practicable, and economically sound."

Again I said:

"There is not at hand sufficient dependable information as to the amount of water which can be called surplus and thus available for transmountain diversion from the headwaters of the Colorado River or any of its tributaries to justify favorable action by this committee."

I think I would supplement what we said in 1953 from two standpoints. First would be an analysis of the Hill report to which we referred in our testimony, which will establish the fact beyond question that any water taken by the Fryingpan-Arkansas project would deprive the western slope of that much water for its own development. Second, from an economic standpoint the amount of money spent on the Fryingpan-Arkansas project to divert and put to use 69,000 acre-feet of water would be sufficient to put to use several times that amount of

water on the western slope. Hence, the project is not economically feasible. Your statement will be supplementary because the Hill report has been published since the date of those hearings.

On the subject of the amount of water available for all purposes in Colorado, on the second page of the letter of transmittal accompanying the Hill report you will find this statement:

"6. The present uncommitted surplus which can be relied upon for use in Colorado is thus 1,450,000 acre-feet per year."

That statement should be subject to some analysis. On page 16 of his report, Hill says:

"This total depletions arising out of transmountain diversions with existing facilities could be 388,200 acre-feet including evaporation losses from reservoirs provided to make such diversion possible."

This figure should be nearer 500,000 acre-feet. However, even though that is a substantial amount of water we can disregard it in giving further consideration to Hill's conclusion as to the amount of uncommitted surplus.

First, and from the 1,450,000 acre-feet, must be subtracted approximately 300,000 acre-feet which is or probably will be Colorado s share of the burden of the Mexican Treaty. Mr. Hill, in his analysis, completely ignored this treaty and admits now that he did so. Estimates of the amount of water which Colorado must supply under the Mexican Treaty range from 190,000 acre-feet (Crawford's estimate) to approximately 400,000 feet. Clifford Jex estimates it at 300,000 acre-feet and I am inclined to accept his figures. If this figure is correct, then the uncommitted surplus becomes 1,150,000 acre-feet per year.

Next, on the second page of the letter of transmittal Mr. Hill says:

"Development of the oil-shale reserves in western Colorado should be anticipated and the consumption of water for industrial municipal and other purposes resulting therefrom may reach 300,000 acre-feet per year."

Boyd Guthrie, who has long been the head of the oil-shale experimental plant at Rifle, the officials of the various oil companies interested in that development and Tell Ertl, now on the faculty of Ohio State, say that 300,000 acre-feet is the minimum, which does not include the amount which will be necessary for municipal and domestic use for increased population of approximately 350,000 people. Therefore, deducting the minimum of 300,000 acre-feet, Mr. Hill's uncommitted surplus becomes 850,000 acre-feet.

On page 35 of the Hill report, we find this:

"Should subsidies as great as $600 per acre be permitted (in western Colorado development) the resulting stream depletion at sites of use might reach 800,000 acre-feet per year. If there should be no limit upon subsidies to irrigation, then the entire surplus available to Colorado could be consumed by irrigation of new lands."

If subsidies to irrigation be limited to $600 per acre, then the uncommitted surplus which Mr. Hill estimates presently at 1,450,000 acre-feet becomes 50,000 acre-feet, which, of course, would be far less than the amount that would be required for domestic and municipal purposes for increased population.

Contrast the $600 per acre subsidy limit imposed by Mr. Hill in the above statement with the subsidy to irrigation involved in the Fryingpan-Arkansas project of $1,735 per acre and where do you come out? The amount of this subsidy is estimated by Mr. Clifford Jex, who I think will verify that statement.

From the standpoint of economic feasibility, events which have transpired subsequent to the 1953 hearings should be presented to the committee. One of these is a report by region 4 of the Bureau of Reclamation promulgated February 1954, entitled "Cliffs-Divide Project—Colorado." The authorization of the construction of some of the units included in the Cliffs-Divide project, together with some included in the Gunnison River project of region 4, and some 1 or 2 in the Southwestern area are incorporated in amended Senate bill 500, United States Senate, and in H. R. 3384 of the House of Representatives. There are 18 so-called participating projects in Colorado which are included in these 2 bills. These projects are designed and will be constructed for the purpose of putting water of the Colorado River to beneficial use. A study of the construction costs, the amount of water which will be so applied, and the acreage of land to be developed by these participating projects should be made. I don't have all of that information; but I can give you the results of such a study when applied to the Cliffs-Divide project. There are eight projects in the Cliffs-Divide plan. The total

cost of construction of these 8 projects is $120,052,900 as compared with what I understand to be the present estimated cost of the Fryingpan-Arkansas project of $168,000 or thereabouts.

Next logically follows an analysis of the results obtained by these two schemes. First, with regard to the Fryingpan Arkansas project. Let us assume that all of the 69,000 acre-feet of water is used for irrigation purposes in the Arkansas Valley. The consumptive use of water in that area is not less than 1¼ acre-foot per acre. Thus the 69,000 acre-feet would irrigate 56,250 acres; and this would have to be done by successive reuse of the return flow of the water to the stream, which, on account of the high evaporation loss in that area, makes it highly impracticable. To put it another way the application of not less than 4 acre-feet of water per acre would be required in the Arkansas Valley to produce a crop. The first irrigation therefore, from the 69,000 acre-feet would cover 17,250 acres; and the return flow would then, of course, irrigate additional acreage; but between the time of the original use and the second, third, and fourth application you would experience a much higher rate of evaporation than on the western slope, and particularly at higher elevations.

The 8 projects in the Cliffs-Divide plan would divert and impound 409,300 acre-feet of water. This water would irrigate 112,930 acres of new land and provide supplemental water for 44,565 acres of land, presently but inadequately irrigated. There should be a similar analysis of the units incorporated in the Gunnison River project and the Dolores River project in southwestern Colorado; and I don't have the information at hand with which to make that analysis. When made, I think it will show that practically the entire 800,000 acre-feet of water is to be included in those projects, which 800,000 acre-feet is 50,000 acre-feet less than the present uncommitted surplus which analysis of the Hill report shows exists. I quarrel with that analysis but for the purposes of this discussion it can be accepted as accurate.

The fact that the present Colorado River storage bill pending in Congress incorporates in it these numerous participating projects led the Colorado River Water Conservation District Board to adopt a resolution within the past few months, a copy of which you may already have—but if you don't it can be obtained from Frank Merriell—which resolution, in effect, asks Congress to defer approval of the Fryingpan Arkansas project until the Colorado River storage bill had been approved. This is a substantial change in the former policy of the Colorado River Board which unconditionally approved the project. I think a copy of that resolution should be incorporated in your statement and pretty strong reference made to it.

I don't need further to analyze and compare the economic justification for the feasibility of the Fryingpan Arkansas project, and the participating project portion of the Colorado River storage project bill. Incidentally, the figures I have given you above are those I had in mind when I appeared before your committee in Denver and told that committee that there was no surplus water in the Colorado River. It might be that you could show these figures to Frank Hays for his edification.

I hope that this incomplete and probably inadequately worked out analysis of what should now be presented to the committee in objection to the Fryingpan Arkansas project will be of some help to you. I am just as bitterly opposed to that thing as I ever was—even more so since the Hill report and the Cliffs-Divide report came out. Approval of that project would be the same as the stamping of legality on the stealing of water which belongs to us by eastern Colorado; and I cannot conceive the congressional committee approving such a completely infeasible and unjustifiable project when the facts are brought to the attention of that committee. The facts reflected by the Hill deport and those contained in the Cliffs-Divide report and in the Gunnison River report establish completely the correctness and justification of the objections we made in June 1953 to this same committee, and I hope that, in the statement you make, you will bring this to the attention of the committee rather forcibly.

If I can be of further help to you in formulating the statement you wish to make, please feel free to call upon me.

In the meantime, do your durndest to get that Conservation Board revamped and at least those ex officio members deprived of a vote.

Yours very truly,

JOHN B. BARNARD,
Attorney at Law.

Mr. ASPINALL. Mr. Olson, do you have a statement?

Mr. OLSON. Yes, I have a short statement. But before I read it, I would like to again emphasize, in view of what Mr. Stewart has testified to, that the pictures handed to the committee showing the collection area on both sides of the slope were taken only last Saturday. I think that is particularly important to emphasize again in view of Mr. Stewart's testimony that the collection has to take place during this time of the year—April to July.

My name is L. K. Olson, lawyer, 1026 16th Street NW., Washington 6, D. C., representing the Board of Commissioners of Pitkin County, Colo., the Pitkin County Water Protection Association, and the Aspen (Colo.) Chamber of Commerce, all of whom oppose absolutely the transmountain diversion features of the Fryingpan-Arkansas project, H. R. 412.

This opposition is based on a firm conviction that the benefits to the Arkansas Valley do not justify either the cost to the Nation, or the resulting damage to the western slope.

Transmountain diversion will bring to the Arkansas Valley only 69,000 acre-feet of water. Reregulation of water native to the Arkansas Valley will yield twice as much water for a small fraction of the cost. Both the Department of Agriculture and the Bureau of the Budget have recommended separating transmountain diversion and reregulation of native east slope waters because of the high cost of the former. Instead of facts, we get only the conclusion that the 2 cannot be separated, and the 145,000 acre-feet of east slope water cannot be saved without the small additional amount of water from across the mountains. The question having been raised, officially and in good faith, one might reasonably hope for a rather complete explanation, especially in view of the cost.

The question of costs and benefits is very obscure. With all the engineering time and talent spent on this project, costs should be firm and clear. Unfortunately, this is not the case. First of all, past experience indicates the Bureau of Reclamation's estimates are far from reliable. Big Thompson was originally estimated at around $32 million, and ended up costing about 5 times that.

In addition, the interest-component device, and the latest variation, the Collbran formula, obscure the real cost to the Treasury through financial sleight-of-hand.

Interest costs to the Treasury, on projects running the length of this one, are greater than construction costs. Unfortunately, from the standpoint of presenting a clear picture of cost, interest cost to the Treasury has not been calculated in the official presentation. Benefit calculations are even more obscure. We understand they are made on the basis of 100 percent of parity and price index of 215. Presumably this would involve net, not gross, added income—which might be rather small if the farmers pay the proposed prices for water. Or, if their prices are less than parity, which we know very well to be the case. There is something less than 85 percent of parity right now, and that would mean that the benefit calculations are at least 15 percent off when they are adjusted. I base that on the testimony over on the Senate side that the benefit calculations were predicated on 100 percent of parity for the prices of the farmers. Of course, under the variable repayment we can expect the rates to be adjusted downward, but that, in turn, destroys the validity of the payout schedules.

The cost of this project to the taxpayers is tremendous. Including interest costs to the Treasury—a very real cost in this project—the subsidy to each acre of land irrigated is several times the value of the land after irrigation. Judging from the farm surplus problem, we do not need more farmland that bad. And the taxpayers of the Nation would seem entitled to catch up on accumulated bills before extensive new ones are incurred. Too large a part of the annual budget already involves nothing but debt service, or interest costs.

We realize this project must be judged by national, not local, interest. On that basis, we do not see how it can be justified. However, since the eastern slope proponents speak only of their local interests, we feel free to mention ours.

There is the matter of Aspen's thriving summer and winter vacation business, which brings over 135,000 customers to the area each year. Obviously this will be largely lost if the primitive beauty of the area is cut up by tunnels, ditches, dams, and construction equipment.

There is the matter of the future of the western slope. There are great deposits of oil shale in the area. Both the Federal Government and private enterprise have spent millions in pilot operations. The western slope has a real potential for industrial development and for population growth, if it is not deprived of essential water. It is also quite significant that people beyond Aspen and Pitkin Counties have recently changed their minds and now oppose Fryingpan-Arkansas. I refer specifically to the action of the Western Slope Commissioners Association, the action of the Holy Cross REA with its 1,900 members in several counties on the western slope, and the action last November of the board of the Colorado River Water Conservation District, in which they insisted that the upper Colorado project not only be authorized but completed before you go ahead with the Fryingpan-Arkansas.

I thank you.

Mr. ASPINALL. I thank you very much for your statement.

Off the record.

(Discussion off the record.)

Mr. ASPINALL. The Chair recognizes the gentleman from Texas.

Mr. ROGERS. I have no questions, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. Mr. Gerbaz, how long have you lived in that area?

Mr. GERBAZ. 54 years. I was born there.

Mr. SAYLOR. Have you gone over this entire area in which they propose to erect a dam and build these various high-level canals?

Mr. GERBAZ. My brother and myself run sheep on the outside of the Fryingpan-Arkansas diversion, where part of the catch ditches and canals and stuff would be located.

Mr. ASPINALL. Would the gentleman yield?

Mr. SAYLOR. Yes.

Mr. ASPINALL. As I understand, Mr. Gerbaz, you run your sheep at the headwaters of the Woody Creek; is that right?

Mr. GERBAZ. Mr. Chairman, it is over the top of Woody Creek. It is from Chapman Creek west to Foster Creek and Deeds Creek to the head of Rocky Ford on the Fryingpan drainage. Our forest permit calls for that area.

Mr. SAYLOR. Now, Mr. Gerbaz, I want to ask you a question. What kind of arithmetic do they teach out there in Colorado on the western slope? When you add 2 and 2 do you get 4?

Mr. GERBAZ. That is what I thought.

Mr. SAYLOR. Using that simple arithmetic, I would like you to apply it to the Bureau of Reclamation's calculations. They say that they are going to divert 69,000 acre-feet from the Fryingpan drainage area, and under Colorado law they are going to supply you with a reservoir to take care of the amount that they have diverted so that you will not lose anything. I want you to tell me how you can build a reservoir in Aspen that holds 28,000 acre-feet and out of that reservoir supply 69,000 acre-feet of replacement water. I want to know whether the simple arithmetic they teach you over on that slope will enable you to do it.

Mr. GERBAZ. The part I do not understand and I would like to have made clear to me is this: If the Fryingpan-Arkansas diversion is authorized and constructed, if there is but one little creek left by the name of Difficult that will be alive to feed the 28,000 acre-foot dam, because the Fryingpan diversion is going to have a tunnel into Hunter Creek, which is in the Roaring Fork area drainage, and pick up the headwaters of Hunter Creek and divert through, as I understand the project, the tunnel on the Fryingpan. Storage replacement should be, in my estimation, 3 to 1, three storage to one diverted. I cannot see how we are not hurt by that kind of figuring.

Mr. SAYLOR. That is one of the simple propositions that I have been trying to get somebody from the Bureau of Reclamation to tell me—how they are going to perform these mental gymnastics with figures and water.

One of the reasons that I have questioned the feasibility of this project is just that. They have come here and told this committee and have gone out in the eastern slope and sold the folks a bill of goods that you folks on the western slope are not to be hurt. Yet the basis for a great deal of their testimony is the various years' runoffs, that some years you might have a tremendous runoff, and then it may be down in other years, that other years you will have hardly any runoff. So that in an effort to provide the western slope with the amount of replacement water which they say they are guaranteed, they are going to put in a reservoir which will hold substantially one-third of what they take out each year.

Now if anybody on the western slope can answer that question as to how they will not be hurt, I would like to have them tell me and other members of this committee.

Mr. CHENOWETH. Will the gentleman yield right there?

Mr. SAYLOR. Just a minute.

Mr. CHENOWETH. You wanted the information. We would like to give it to you.

Mr. SAYLOR. I am asking the witnesses here now.

Mr. GERBAZ. The reason that we will be hurt—when that 28,000 acre-feet drains, senior rights will take it. Like down at the Grand Valley Ditch & Canal Co., I think it has senior rights over all of us in that upper end because we are younger country down there, and over at Twin Lakes, too.

Mr. SAYLOR. The representatives of the Colorado Board that were here yesterday are the group that under the laws of the State of Colorado are charged with allocating water; is that correct?

Mr. GERBAZ. That is right.

Mr. SAYLOR. And the principle still holds true in Colorado, does it not, that the prior appropriated rights, regardless of where they are on the river, come first?

Mr. GERBAZ. That is right.

Mr. SAYLOR. I would like to ask Mr. Stewart if that is a correct statement of the law.

Mr. STEWART. Yes, sir.

Mr. ASPINALL. If the gentleman will yield, I do not want these witnesses to be placed in the wrong position, and I do not want the committee mislead. The Colorado Water Conservation Board has nothing to do with the allocation of water or distribution of water. The administering of decrees is taken care of by the State engineer. The State engineer takes care of that, the Colorado Water Conservation Board takes care of the policy.

Mr. STEWART. That is right.

Mr. ASPINALL. And the State engineer has charge of allocating water. You pursue the filings through the local courts to get a decree; is that correct?

Mr. STEWART. Once a decree has been entered, then the State engineer is charged with the duty of administration of those appropriations to see that the prior appropriator has his preference. In other words, users take their water in the order of their water priority, the senior rating over the junior.

Mr. ASPINALL. Thank you.

Mr. SAYLOR. And the three decrees which Mr. Stapleton presented here are all prior rights to any which the Bureau of Reclamation or the Twin Lakes group or anybody else might have to the water in question; is that correct?

Mr. STEWART. That is correct.

Mr. SAYLOR. I might say that we will probably end up here in the same situation we did in Eklutna, Alaska, authorizing a project and having no rights to water whatsoever to go into it.

When did the commissioners of the western shope have their meeting at which they disapproved this project?

Mr. OLSON. Are you referring to the Commissioners Association meeting or——

Mr. SAYLOR. The Commissioners Association meeting.

Mr. OLSON. In Craig, in 1953, the last time.

Mr. SAYLOR. There has been no action taken since that time that you know of by the Commissioners Association disapproving their previous stand?

Mr. OLSON. No, I do not know of any.

Mr. SAYLOR. Did they represent the county commissioners of just the western slope or all of Colorado?

Mr. OLSON. Just the western slope.

Mr. SAYLOR. I want to take this opportunity to commend you three men who come from out in that area for coming here and presenting to this committee your testimony. I can tell you very frankly that I am not impressed with 30,000 people that signed on the other side.

It is a matter of simple justice as far as I am concerned. The mere fact that 30,000 people would like to take something that you have, I am not impressed by that at all. In fact, I am all the more imbued with the spirit of wanting to help the people that live in the area that are going to be deprived of their livelihood. I want to commend you for the excellent work you are doing out there.

That is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentlewoman from Idaho, Mrs. Pfost.

Mrs. PFOST. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from Utah, Mr. Dawson.

Mr. DAWSON. I have one question for the witness. I think some of you have commented on this. I think you made the statement that you favor the construction of the upper Colorado project before the Fryingpan.

Mr. OLSON. That, sir, was the resolution of the conservation district.

Mr. DAWSON. I would ask all of you, as a group, do you favor the upper Colorado project?

Mr. GERBAZ. Not parts of it, no.

Mr. DAWSON. What about the other witnesses?

Mr. STEWART. I feel much the same way. There are parts of it that I would not go along with.

Mr. DAWSON. In your statement you said that you favor the construction of the upper Colorado project first.

Mr. OLSON. That, sir, was a resolution we were presenting to the commitee, a resolution—the titles are so similar—of the board of the directors of the Colorado River Water Conservation District.

Mr. DAWSON. I see.

Mr. OLSON. That is a west slope conservancy district authority.

Mr. DAWSON. And you are not representing that district here?

Mr. GERBAZ. I am a member of that board but not representing that district board here.

Mr. DAWSON. But you are submitting that resolution?

Mr. GERBAZ. Yes, that was passed at a board meeting.

Mr. ASPINALL. Will my colleague yield?

Mr. DAWSON. Yes.

Mr. ASPINALL. You will remember that last year the present chairman of this committee took the position that the upper Colorado River storage project should be authorized and construction started before the Fryingpan in order to assure the success of the Fryingpan. The resolution passed by the board upheld that position.

Mr. DAWSON. And their position is unchanged, as I take it, at the present time?

Mr. ASPINALL. According to the statement of these witnesses this morning.

Mr. DAWSON. That is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from North Carolina, Mr. Shuford.

Mr. SHUFORD. Mr. Chairman, I just have one or two questions I want to ask.

Some of the witnesses this morning—and any one of you gentlemen may answer this—testified that you were taking no water for diversion purposes above Aspen. I wish you would explain to me

where they are going to get the water for the diversion purposes. They were going to take no water out of the Roaring Fork above Aspen.

Mr. STAPLETON. May I answer that, sir?

Mr. SHUFORD. Yes.

Mr. STAPLETON. As Mr. Gerbaz stated in his statement, they were——

Mr. SHUFORD. It was not one of you gentlemen who made the statement. It was one of the witnesses earlier this morning.

Mr. STEWART. I believe there is water to come out of Hunter Creek, which is a tributary of the Roaring Fork, and that comes in above the Aspen Dam site. Is that correct?

Mr. STAPLETON. It comes in below.

Mr. STEWART. I stand corrected on that.

Mr. SHUFORD. So there would be no water taken above Aspen, the city of Aspen, in this diversion project?

Mr. GERBAZ. That is where it all comes from, it all comes from above Aspen.

Mr. SHUFORD. It comes from above the city of Aspen?

Mr. GERBAZ. That is right.

Mr. SHUFORD. From the headwaters of the Roaring Fork?

Mr. GERBAZ. That is right.

Mr. SHUFORD. I think that is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

Mr. CHENOWETH. Mr. Olson, I would like to address a question or two to you first. You state you represent the Board of Commissioners of Pitkin County?

Mr. OLSON. Yes.

Mr. CHENOWETH. The Pitkin County Water Protective Association and the Aspen Chamber of Commerce?

Mr. OLSON. Yes, sir.

Mr. CHENOWETH. And I believe you represented the same groups in the hearing before the Senate.

Mr. OLSON. Yes.

Mr. CHENOWETH. Would you say, Mr. Olson, that the opposition to this project is generated pretty largely in Pitkin County and the Aspen area?

Mr. OLSON. I would say that my friends from Pitkin County have been the most vocal because they are the first to get hurt. It costs them money to come back here and testify. We had that problem brought up to us yesterday in connection with the preparation of the statements. It cost us $125 to get the statements mimeographed in adequate quantity for the committee. These people have feelings on it, but it costs money. It costs a couple of hundred dollars to travel out here and money to present your statement. I think that is why you have not heard from them.

Furthermore, as Mr. Gerbaz said, his rights are junior, and he is going to have his water shut off before the people down below at Grand Valley, so he is going to get hurt first.

Mr. CHENOWETH. Now, Mr. Olson, I am sure you want to be fair.

Mr. OLSON. Yes.

Mr. CHENOWETH. And I am sure you do not want to mislead this committee.

Mr. OLSON. I certainly do not.

Mr. CHENOWETH. I am sure you do not want to tell the committee we are going to deprive Mr. Gerbaz or anyone else of water they are entitled to.

Mr. OLSON. Mr. Gerbaz is the one to answer that. I am under the impression he is alarmed because——

Mr. CHENOWETH. What is your alarm, Mr. Gerbaz?

Mr. GERBAZ. To explain that, I would like to put it this way: There have been many changes on the western slope in the last 20 years. I made this statement here last year and I would like to make it again.

We used to have, for an illustration, a cattle permit for 300 head on the United States Forest Service land. That permit started in June, early in June, sometimes in May, and we did not get off of the hills until October. They kept cutting that permit until we were down to 135 head preference right——

Mr. CHENOWETH. You are talking now about some permit with the Forest Service, are you not?

Mr. GERBAZ. That is right, but I want to explain why the water situation, where it comes in.

We had to quit cattle and go into sheep. Our permit is 82 days on the range now. We have to have additional water to supplement the forest forage that we cannot get on the forest. We go out on the forest now no earlier than the 25th of June, usually the 1st of July, and they cut our permit another 12 days last year, and we have to be out of there by the 20th of September. In order to have good lands we irrigate while we are gone. We irrigate every 12 to 14 days, go over the land.

Mr. CHENOWETH. Right there——

Mr. GERBAZ. That is extra water. There are many side creeks.

Mr. CHENOWETH. This project is not going to take any of that water away from you, is it?

Mr. GERBAZ. Yes; it will.

Mr. CHENOWETH. How.

Mr. GERBAZ. If there is a shortage of water down below, the commitment to Lee Ferry——

Mr. CHENOWETH. Wait a minute. You are going into something far and beyond what is involved in this project, are you not? Are you going to go into the differences now and the attitudes and opinions between California and Arizona as to interpretation of the compact?

Mr. GERBAZ. Now listen. I am not representing myself as an expert——

Mr. CHENOWETH. You are going far afield, and I am afraid we are going to be here for some time.

Mr. GERBAZ. I am not qualifying myself as a water expert, but as a practical irrigator. And I have irrigated for 40 years. When I go to the headgate to get water for our adjudication—we have 226 tenth feet—I know if there is no water there I will not get it.

Mr. CHENOWETH. But the project will not take any water away from you.

Mr. GERBAZ. It will in senior rights down below, take our rights.

Mr. CHENOWETH. Is not Aspen——

Mr. GERBAZ. We don't take it out of our own fork, we take it——

Mr. CHENOWETH. Through an exchange, your rights would be fully protected by the water that is going to be made available in the Aspen Reservoir to take care of all existing rights on the Roaring Fork.

Mr. GERBAZ. The only thing——

Mr. CHENOWETH. As a matter of fact, there is going to be a surplus of water, as I understand, in Aspen Reservoir. Testimony has been produced before the committee that Aspen Reservoir is going to be considerably larger than would be otherwise be necessary.

Mr. GERBAZ. Congressman Chenoweth——

Mr. CHENOWETH. You heard that statement this morning.

Mr. GERBAZ. If that could be a fact, I would get a DC–7 out of here as fast as I could go and be tickled to death to go home, because I don't like this work. We do not believe that. How can they divert 69,000 acre-feet of water and give us a 28,000 acre-foot dam? And if the upper Colorado goes over with some of the things in it, we are worse than sunk.

Mr. CHENOWETH. You had a very dry year last year, did you not?

Mr. GERBAZ. Yes.

Mr. CHENOWETH. If you have studied the water available in the Roaring Fork and in the Colorado River Basin over a period of 25 years, do you not find that in most years, in fact almost every year, there is a surplus of water? Is that not true, Mr. Gerbaz, over a period of years?

Mr. GERBAZ. There may be some surplus.

Mr. CHENOWETH. In how many years would there not be a surplus? I have a statement showing the water available for Colorado from the Colorado River Basin, and in most of the years it shows a considerable surplus.

Mr. GERBAZ. All right. For the lack of water, some of these farmers over there—if it is permissible, I will use specific cases, Mr. Chairman.

Mr. ASPINALL. Certainly.

Mr. GERBAZ. Especially out of the Fryingpan. This year they burned out on what we call the Missouri Heights, where, if they had the money to do it, personally now, they would build a ditch from Missouri Heights Reservoir—they build a reservoir themselves—to the Fryingpan and store the water in there.

On Capital Creek on the other side, a tributary of the Roaring Fork, there are just four farmers there that have enough water. Last year there were 5 or 6 of them burned out who had to buy hay.

Mr. CHENOWETH. As I say, last year was practically the driest in history.

Mr. GERBAZ. 1954.

Mr. CHENOWETH. Yes, one of the driest in history.

Mr. GERBAZ. Every year some farmers up there do not have enough water because their rights are not early enough and senior rights shut them off. I will leave that up to Les Finn, the water administrator in Glenwood Springs, and a very fair man.

Mr. CHENOWETH. You have heard the testimony of Mr. Crawford, who is director of the Colorado State Water Conservation Board, and the testimony of the Bureau of Reclamation officials that water is available for this project.

Mr. GERBAZ. I do not follow that.

Mr. CHENOWETH. The figures have been checked by independent engineers, and they found the water is available.

A question has been raised about the accuracy of the figures of the Bureau of Reclamation. I want to say a word for the Bureau. I think they have done a pretty good job in figuring the cost of this project. These figures were not arrived at hastily, Mr. Gerbaz.

Mr. GERBAZ. No.

Mr. CHENOWETH. It has been studied for a period of 20 years, has it not? There is nothing new about it.

Mr. GERBAZ. Their experts—I would like to use, if it is permissible, an example of Reclamation. I will take the Woody Creek unit.

Mr. CHENOWETH. What are you referring to now?

Mr. GERBAZ. The Woody Creek unit, and that is supposed to be, I think, in the upper Colorado storage plan.

Mr. CHENOWETH. What you are talking about now is some project in the upper Colorado project?

Mr. GERBAZ. What?

Mr. CHENOWETH. You are talking about a project in the upper Colorado project?

Mr. GERBAZ. At Woody Creek.

Mr. CHENOWETH. Another project?

Mr. ASPINALL. If the gentleman will yield for just a moment.

Mr. CHENOWETH. Yes.

Mr. ASPINALL. Woody Creek is one of the proposed participating projects in the upper Colorado project, with a benefit-cost ratio, according to the Bureau of Reclamation, of something better than 3 to 1.

Mr. CHENOWETH. That is a participating project?

Mr. ASPINALL. That is a participating project. But, on the other hand, it is a project with sufficient feasibility to it that undoubtedly the local users could go ahead and finance it and construct it themselves, if it is as good as the Bureau of Reclamation says it is.

Am I correct, Mr. Gerbaz?

Mr. GERBAZ. Yes. This is specifically—it is under Cliffs Divide project, the Glenwood Springs Division, Woody Creek unit.

To shorten the time, this involves Salvation ditch. And I think our chairman has heard something about the Salvation ditch. That takes all of McLain Flats and Woody Creek itself. Woody Creek is bone dry the first of August.

The Salvation ditch operates under a decreed water right of 96.5 second-feet, which is senior to the rights of the upper stream Independence Pass transmountain diversion mentioned in chapter 1.

Actual diversions to the Salvation ditch presently are limited in effect to about 30 second-feet.

That is absolute fact. I accept them as facts. They are only drawing 30 second-feet.

Because of an inadequate diversion structure, limited ditch capacity, and leaky sections, the increased diversion required for the project could be made within the decreed right of the ditch, but some curtailment would be necessary in dry years in the Independence Pass transmountain division.

Now we will go into the cost.

The Salvation ditch, with an overall length of about 16.5 miles would be enlarged from an existing capacity of 30 second-feet to a capacity of 40 second-

feet. The present diversion works, various flumes, waterways, turnouts, and culverts would be replaced.

The cost on it.

Salvation ditch, rehabilitation and enlargement, $170,000 for 10 second-feet.

Waco diversion dam is $8,100; past investigations, $1,000; future investigations, $5,000; a total of $184,400. That is $18,000 a second-foot.

The private estimates, the highest that they had to add an additional 25 second-feet—they don't think they can get the 96½—was approximately 65,000 to 75,000.

Mr. CHENOWETH. Mr. Gerbaz, is it not true that the principal reason for this opposition in Pitkin County and Aspen stems from the fact that a couple of homeowners are going to lose their beautiful homes and they more or less keep this opposition alive? Is that a fair statement?

Mr. GERBAZ. Absolutely not a fair statement. I have consistently fought this thing. I am not a millionaire. I make a living, and that is all I make. There are four brothers——

Mr. CHENOWETH. You boys have been opposed to the project?

Mr. GERBAZ. I am opposed.

Mr. CHENOWETH. You were here last year and testified against it?

Mr. GERBAZ. You "betcha."

Mr. CHENOWETH. And you are still opposed to the project?

Mr. GERBAZ. You "betcha."

Mr. CHENOWETH. And no facts or figures can be given to you which would change your opinion?

Mr. GERBAZ. When I can pick up my irrigation shovel and go over to the headgate and the water is flowing by, I know I have got it.

Mr. CHENOWETH. Is it not rather significant, Mr. Olson, if this great damage is going to be done to the western slope, there are not some witnesses here from other areas on the western slope protesting against this project?

Mr. OLSON. I do not think I am unduly sympathetic with people——

Mr. CHENOWETH. Is it not rather significant that the opposition is centered here in Aspen where these two prominent persons live? And I sympathize with them. I am sorry. I hate to see anyone lost their homes. And they have been able to keep their opposition alive as evidenced by the statements here today.

Mr. OLSON. Mr. Gerbaz and Mr. Stapleton and Mr. Stewart are not here at the expense of these two people that you speak of.

Mr. CHENOWETH. I am not raising the inference they are.

Mr. OLSON. The two people you speak of—Mr. Stapleton has been a dirt farmer and miner and is county clerk. His people must like him. He is not coming out here for a personal interest. Mr. Gerbaz and his brothers have been raising sheep for 40 years up there, and he is county commissioner, and the people there must like him.

Mr. Stewart is practicing law there.

Mr. Gerbaz tells us the 21 commissioners of the county association were opposed to it. I am sure they did not do it because the two wealthy gentlemen want them to do it. The Holy Cross Electric Association represents 1,900 poor farmers that use the REA juice, and they have presented a resolution. So there must be more than the two wealthy farmers opposing it.

Mr. ASPINALL. The subcommittee will stand in recess until 11:30.

(A recess was taken at 11:15 a. m., and the subcommittee reconvened at 11:35 a. m.)

Mr. ASPINALL. The subcommittee will be in session. At the time of the recess the gentleman from Colorado, Mr. Chenoweth, had charge of the time.

Mr. CHENOWETH. Mr. Olson, we were discussing the REA situation, I believe, when we recessed. The Holy Cross REA serves the town of Aspen, does it not?

Mr. GERBAZ. Yes.

Mr. CHENOWETH. That would pretty well account for its opposition to this project.

Mr. GERBAZ. The office is in Glenwood Springs.

Mr. CHENOWETH. But it serves the town of Aspen.

Mr. GERBAZ. That is a very small unit of what it does serve. The whole community is served by that.

Mr. CHENOWETH. Would you not say it is fairly obvious that is the influence that led to the adoption of this resolution?

Mr. GERBAZ. Congressman Chenoweth, I do not think too much influence from Aspen would influence them on that. They did it on their own. I never approached them personally. I do not know who approached them about it.

Mr. CHENOWETH. Somebody did.

Mr. GERBAZ. Somebody probably did.

Mr. CHENOWETH. This is the reason I mention the matter. Yesterday we had the assistant manager of the National Rural Electric Cooperative Association and the manager of the Colorado State REA Cooperative Association and managers of a number of local REA associations, all of whom were enthusiastically in favor of this project. So it appears rather strange that just one REA local association would oppose it.

Mr. OLSON. Would not the explanation lie in the fact they are looking for an additional source of power and are not being hurt, but the people of the Holy Cross REA would get the power at the loss of water to the western slope. That might explain the difference of opinion.

Mr. CHENOWETH. You mentioned the loss of water to the people on the western slope. Are you familiar with the operating principles adopted by the policy review committee and approved by the Colorado Water Conservation Board on this project?

Mr. OLSON. No, sir.

Mr. CHENOWETH. They are made a part of this legislation through reference to the Senate document which contains them.

Mr. OLSON. I have read them, but I am not familiar with them; no, sir.

Mr. CHENOWETH. Do you know of any way in which representatives of the water interests on either the western or eastern slopes could improve on those operating principles? These principles were adopted after full consideration. The review committee was composed of members from both the western and eastern slopes, highly skilled and expert water lawyers and engineers, and they arrived at these operating principles as a fair and equitable adjustment of this water diversion program.

Mr. OLSON. We understand——

Mr. CHENOWETH. Do you know of any intention, or have you heard of any inclination on the part of anyone on the eastern slope to modify or to change or to avoid, directly or indirectly, any of those principles?

Mr. OLSON. Well, sir, out of the thousands of pages that have been printed on this and various recommendations of principles and facts, and all, it leaves the people on the western slope simply with an apprehension, and I think they are very sincere in their apprehension that this is going to hurt them in a variety of ways.

Mr ASPINALL. Will the gentleman from Colorado yield to the chairman?

Mr. CHENOWETH. I will be glad to.

Mr. ASPINALL. I think we should have a clear picture of just how some of the people in western Colorado feel about this.

Mr. Gerbaz in his statement referred to a letter from Mr. Barnard.

Mr. GERBAZ. Mr. Stewart.

Mr. ASPINALL. Pardon me. Mr. Stewart. In Mr. Barnard's letter he stated his opposition. Now am I not right, Mr. Stewart, that the reason Mr. Barnard stated his opposition is because Mr. Barnard has seen and has studied the results of the operation of Senate Document 80 of the Colorado Big Thompson project authorization?

Mr. STEWART. Yes.

Mr. ASPINALL. And he has seen where the people of that upper area of the main stem of the Colorado River have been hurt somewhat because of the operating administrative procedures; is that correct?

Mr. STEWART. That is my understanding.

Mr. ASPINALL. Now the people of the Roaring Fork, Mr. Gerbaz, feel that the operating agreement that is referred to in the conferences held by the different spokesmen for Colorado was largely a forced matter as far as diversion was concerned; is that correct?

Mr. GERBAZ That is correct, sir.

Mr ASPINALL. In other words, they feel it was like placing them before the wall with a gun in front of them?

Mr. GERBAZ. Could I illustrate that just a bit?

Mr. ASPINALL. Yes.

Mr. GERBAZ. There was a meeting held in Aspen, I think, in 1951, and we were told this diversion is going to go anyway and this may hurt us the least. We have refused to accept defeat.

Mr. ASPINALL. And those who did accept and enter into the agreement for the different organizations in western Colorado were also advised it would be the last one for a long while; is that correct?

Mr. GERBAZ. Absolutely correct.

Mr. ASPINALL. And yet soon after that another request was made for diversion; is that correct?

Mr. GERBAZ. That is right.

Mr. ASPINALL. And that is one of the reasons why the people of your area feel so deeply about whether or not any operating agreement will be kept; is that correct?

Mr. GERBAZ. That is correct.

Mr. ASPINALL. In letter as well as in spirit of the operating agreement?

Mr. GERBAZ. That is correct.

Mr. ASPINALL. With that background, my colleague, I wish you would direct your questions to these people and see if they fully understand what is in the operating agreement, and if they would go with

the authorization if the operating agreement were followed according to the letter and spirit of it.

Mr. CHENOWETH. I believe Mr. Olson stated he is not familiar with the operating principles.

Mr. OLSON. I have read them, but I think when we have three men here who go to the spigot for water, I think it is better to let them answer the questions than myself, because I have no real knowledge.

Mr. CHENOWETH. I would be happy to hear from any one of the group and their objections to the operating principles agreed upon by the policy review committee, and I believe unanimously adopted by the Colorado Water Conservation Board, which agency speaks officially for the State of Colorado upon water matters.

Mr. GERBAZ. The Colorado board, you say?

Mr. CHENOWETH. Yes.

Mr. GERBAZ. It is controlled by the eastern slope.

Mr. CHENOWETH. Well, you have western representaives on the board.

Mr. GERBAZ. But we get voted down every time a western thing comes up.

Mr. CHENOWETH. The western slope representatives have the same right to voice objections and make their position known as any other member of the board.

Mr. GERBAZ. I imagine they have.

Mr. CHENOWETH. I know some of the representatives who have represented the western slope personally, and I know they are men who would not falter in the least in representing the western slope of Colorado in seeing that the western slope obtains every drop of water to which it is entitled. They have done everything in their power to see that the western slope's interests are fully protected.

I would say further, Mr. Gerbaz, I think it is significant that, except for Aspen and Pitkin County, and the group here today, the western slope is not here protesting this project which is pretty good proof of the fact that those who wrote these operating principles did a good job.

Mr. GERBAZ. No, it is not only Aspen. Those are the inferences we do not like.

For your information—and I would go on record on this—Mr. Stapleton was financed to the tune of $300 to make this trip solely from the city of Grand Junction.

Mr. CHENOWETH. You are acquainted with Mr. F. C. Merriell, the chief engineer of the Colorado River Water Conservation District, are you not?

Mr. GERBAZ. Yes.

Mr. CHENOWETH. Are you acquainted with him?

Mr. GERBAZ. Yes.

Mr. CHENOWETH. Do you know of his standing in the western slope and of his long experience and expert knowledge of water matters on the western slope?

Mr. GERBAZ. He knows a lot more about water and engineering than I do.

Mr. CHENOWETH. Mr. Merriell is not one who would in any way do anything to prejudice the interests of the western slope, would he?

Mr. GERBAZ. Just in the Aspen project—I mean in the Fryingpan-Arkansas diversion, he made the statement to me many times, "Now,

Gerbaz, you never did disapprove of the original Twin Lakes diversion, did you?"

I said, "No, because they told us it was going to be floodwaters. We thought it would be a good thing." And then there are many statements that come to us now on the Fryingpan-Arkansas that it is going to be floodwaters.

Mr. CHENOWETH. Is it not generally recognized by Mr. Merriell and his group that the Fryingpan-Arkansas is an approved project?

Mr. GERBAZ. The Fryingpan-Arkansas has been accepted by some on that board as a trading stock for some of the other propositions.

I would like to refer to just one little statement that Mr. Dan Hunter made about how he endorsed the diversion. I have the utmost respect for Dan Hunter.

Mr. CHENOWETH. Everyone has.

Mr. GERBAZ. You bet. I admire the gentleman. But he comes from the San Juan Basin. We are not connected with the San Juan. They refused to go in on that. We were trying to organize a western slope association of all the western slope counties. He refused to go in because he was not in our basin. So it is easy for me or anybody else to go in another basin to vote water to somebody else that does not affect me at all.

Mr. CHENOWETH. Mr. Merriell is not in that position. He is at Grand Junction.

Mr. GERBAZ. No, but——

Mr. CHENOWETH. Grand Junction is very much in the Colorado River Basin.

Mr. GERBAZ. Yes.

Mr. CHENOWETH. Mr. Merriell appeared before this committee on other legislation not long ago and in a statement filed with this committee he shows the Fryingpan-Arkansas as a present consumptive use, which would indicate that it is pretty well accepted and recognized on the western slope that the Fryingpan-Arkansas project has been approved by their people.

Mr. GERBAZ. There are very many, many people on the western slope that do not know that Frank Merriell is for that.

Mr. CHENOWETH. I am just saying what Mr. Merriell told to the committee. Mr. Merriell is an expert water engineer.

Mr. GERBAZ. When they hear he is for it, they do not believe it. That is a fact.

Mr. CHENOWETH. Now the fact that water leaders of the western slope are not here protesting today, after full notice has been given of these hearings, and did not appear before the Senate committee after full notice of hearings, should be proof to any reasonable person. should it not, they are not opposing this project and have accepted and approved it?

Mr. GERBAZ. I would——

Mr. CHENOWETH. Would not that be a fair statement to a reasonable person?

Mr. GERBAZ. I will put it this way: I certainly would like to have a direct vote from the people on the western slope.

Mr. CHENOWETH. I beg your pardon?

Mr. GERBAZ. I certainly would like to have a direct vote of the people on the western slope, and you would be surprised how many are against it.

Mr. CHENOWETH. You are never going to get unanimous approval for any project, are you?

Mr. GERBAZ. No, and you do not have unanimous approval on your side.

Mr. CHENOWETH. I really do not think you will get it on any project. But the fact there has been this general approval, as evidenced by the fact only one county in the western slope, represented by one group here today, is protesting this project, should be pretty good proof, should it not, there is pretty general acceptance of the project on the western slope?

Mr. GERBAZ. I will put it this way: They have felt that there is no use fighting. They are outnumbered. They are outmoneyed. And they are going to be outvoted. That is the attitude a lot of them are taking. They are taking a defeatist attitude—what is the use?

Mr. CHENOWETH. You do not feel, do you, Mr. Gerbaz, there is anyone on the western slope of the Arkansas Valley that has been sponsoring this project or interested in it that wants to do anything in the leastwise that is going to hurt you or anyone else on the western slope or take a drop of water that you are entitled to? You do not really believe that, do you?

Mr. GERBAZ. Purposely, no. I am not accusing anybody of doing those things.

Mr. CHENOWETH. I am sure you would not. I know you are a fair and reasonable man.

Mr. GERBAZ. That is right. If you leave the statement out about the two people from Aspen, it being a fair assumption they are the only ones opposing it up there and starting it—if you leave that out, I will agree to some of the other assumptions you made.

Another thing is this: I made the statement to you yesterday—I think we were joking, and you said you were going to put me on to testify, and I said—and I make this statement and I mean it—that if you would have developed the Arkansas Valley first, controlled your own side first, then we could get an engineering firm and see if any water were left we can both agree on in a friendly way, there would not have been any trouble at all.

Mr. CHENOWETH. I think those possibilities were fully explored, Mr. Gerbaz, by the Bureau of Reclamation and other groups, and so far as I know they were found not feasible.

Mr. GERBAZ. We do not think that is right now. We can be wrong. I am not trying to set myself up as an expert. We just cannot see it.

Mr. CHENOWETH. Do you not think the time has come when we in Colorado ought to get together?

Mr. GERBAZ. It certainly is when the majority quits kicking the minority around. It has always been done.

Mr. CHENOWETH. The fact this agreement was reached on the operating principles and has not been disturbed, and there is no evidence here that anyone intends to violate these principles in any way, is not that pretty good proof agreement was reached and that there should be an end of this controversy so far as eastern and western Colorado is concerned?

Mr. GERBAZ. There is quite a bit of controversy over the upper Colorado, of which your board was approving a big part, but there are things that have come up now they are not approving.

Mr. CHENOWETH. You recognize this is not part of the upper Colorado.

Mr. GERBAZ. Oh, yes, it is all implicated. The effects of the upper Colorado will affect us.

Mr. CHENOWETH. You are wrong in that statement, I think, Mr. Gerbaz, because this project was initiated and studies began long before the upper Colorado project was mentioned.

Mr. GERBAZ. Let me put it this way: Is this a fair assumption—that if Glen Sanders, of Denver, the attorney for the Denver Water Board, is he not?——

Mr. STEWART. Yes.

Mr. GERBAZ. Made the statement to Frank Delaney that they were not goting to stop until they got 477,000 acre-feet. If this did that, is any water left for diversion or anything else?

Mr. CHENOWETH. I do not know what conversation Mr. Sanders had with Mr. Delaney. I know about the group here today sponsoring the Fryingpan-Arkansas project, the Water Development Association of Southeastern Colorado. You have heard the testimony showing some 30,000 signatures of those who are interested in this project. I am speaking for that group who are intensely interested in the water which this project will produce without in the least injuring or damaging anyone on the western slope. There is no intention, Mr. Gerbaz, to take any water that belongs to you or anyone else. We are not trying to do that to you. You have known us for a long time, and I think you must be aware of that.

Mr. GERBAZ. I still repeat at this time——

Mr. CHENOWETH. There can be honest differences of opinion.

Mr. GERBAZ. If you develop the Arkansas Valley first, the Arkansas River, put your dams in—for an illustration, in 1952, when we got the high water over there, there was a little girl drowned at Basalt. I think that was the 7th or 13th of June. The high water is the 20th. People from Basalt called me up and said they knew Twin Lakes headgates were to turn loose this water which came down the Roaring Fork, and would I call the county commissioner and see if they would hold it a few days as it might increase the flow, and there might be a chance to recover the body. At that time I talked to the manager of the Ordway Ditch & Canal Co., in Ordway. I said, "Can't you hold this a few days?" And he said, "We have no place to put it."

I said, "When we agreed to this diversion, you said you were going to take the floodwaters. They are the floodwaters at this very time. Take them. We can spare them." He could not. They had to turn it loose.

Build your storage up first, then let's get an engineering firm that we can both agree on, and if there is any surplus water, you will not find Pitkin County fighting it, and if we have a guaranty.

Mr. CHENOWETH. This is a project which has been recommended by the Bureau of Reclamation, has been agreed upon by the Colorado Water Conservation Board, has been recommended by the administration, in fact recommended by two administrations, both Democratic and Republican. I do not know how much further we have to go or what else we can do to obtain approval of a project of this kind when everyone recognizes the need for it. You heard here yesterday these witnesses tell the committee of the desperate shortage of

water and the need for this project. I do not believe that you or any other group wants to stand in the way of a program such as this, where the water is so desperately needed. I do not believe the people of the western slope want to do that.

Mr. GERBAZ. We are not trying to stop any changes that will not hurt us. God put the water there, and we moved in, and we are going to fight for it.

Mr. CHENOWETH. You have not indicated anything in the operating principles that are necessary to protect you.

Mr. GERBAZ. I have not.

Mr. CHENOWETH. So far as I have been able to ascertain, they fully protect the water users of the western slope. I do not know anything further we can do.

Mr. Chairman, I do not want to prolong this examination. Mr. Sisk is waiting and we have other witnesses.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Sisk.

Mr. SISK. Thank you, Mr. Chairman.

I just want to commend the gentlemen from Colorado, both those who are for this project and those who are opposed to it, for coming back here. I appreciate the expense, of course, which has been mentioned here.

I would just like to direct a few questions to you gentlemen.

Do I understand that the main part of your opposition is due to the fact that you lack confidence in the administration on the part of the Bureau of Reclamation of this particular project; I mean, do you feel that it will not be administered as has been proposed?

Mr. GERBAZ. Yes.

Mr. SISK. It actually represents, then, a lack of confidence on your part in the integrity of the Bureau of Reclamation?

Mr. GERBAZ. Personally, I will not say on the integrity. I would say on the basis on the costs and things they have set out. They are smart men. I do not want to—where I am concerned, I do not want to pick on anybody personally as not being of integrity or anything like that. I do not believe in their working.

Mr. SISK. With that thought in mind, I can appreciate your feeling, and I am not here certainly to put you on the spot by trying to get you to call in question the integrity of anybody.

Mr. GERBAZ. I will answer any question I am capable of answering. That is what I came for.

Mr. SISK. Yet, you understand that if that is to be the position that we all take in the West, that we lack confidence in those who have the authority of administering these projects, why, then we will have to call an end to the projects such as we have developed over the past 50 years. Is that not correct?

Mr. GERBAZ. That is correct. We already have 14 diversions on the Continental Divide.

Mr. OLSON. May I say a word? I think their apprehensions are based on the fact there is so much uncertainty involved about this, and it did start out as a much larger diversion project, and they continually have evidence that may still be lurking in the minds of many people.

There is going to be $150 million or $160 million spent on a project that is going to have 6 power sites on the eastern slope and a tremen-

dous physical outlay for construction over there. What is going to be more logical than, when they get that all set up and water to run it, to come back and want some more water? I think that is the sort of thing they are afraid of, because they feel, from their firsthand knowledge of the water situation on the Roaring Fork and Fryingpan, in that headwaters area, with all the talk about not enough water at Lee Ferry and senior rights downstream, and the conflicting claims at Twin Lakes, and this new thing that has come up of Highline—a month ago Twin Lakes came back and wanted Mr. Gerbaz' conservancy district board to approve diverting some water from irrigation to domestic use so they could furnish water to sell to Colorado Springs at a great profit, and then they indicated to these gentlemen they were going to use that money to line the conduit and collection system so they could take more water. So I think they have a rather fair basis for apprehension that this is a Trojan Horse and they are eventually going to lose water to the point where it is going to hurt them.

I do not think they are here out of any insincerity or distrust of the Bureau, except they are afraid somehow they are going to get hurt in this whole project.

Mr. SISK. With reference to your mention of Colorado Springs, do you feel that Colorado Springs' need of water has anything to do with the recommendation on the part of the administration for this project?

Mr. GERBAZ. On the part of what?

Mr. SISK. Do you feel that the apparent future needs of Colorado Springs for water has anything to do with the recommendation on the part of the administration of this project at the present time?

Mr. GERBAZ. I do not know.

Mr. OLSON. I think that is beyond our ability to answer.

Mr. SISK. Mr. Olson, let me ask you this: If I understand, you are opposed to the upper Colorado River project?

Mr. OLSON. No, sir, we have not taken a position on that. We simply introduced a resolution which said—a copy of a resolution made by a board on which Mr. Gerbaz is a member, in which they expressed the wish that the upper Colorado would be authorized and constructed before the Fryingpan-Arkansas. I think Mr. Gerbaz and Mr. Stewart both said they would object to certain features of the upper Colorado. I think that is the limited position taken by this group.

Mr. SISK. I would like to question you, though, with reference to your personal feelings and not the irrigation district or any Colorado group. Are you opposed in its entirety to the upper Colorado River development?

Mr. OLSON. Sir, I have no basis for a personal feeling on this. I do not know enough about water or the upper Colorado River to warrant stating a position.

Mr. SISK. Are you from Colorado?

Mr. OLSON. No, I am from Wisconsin.

Mr. SISK. You do not live in Colorado?

Mr. OLSON. No, sir. I have friends in Colorado in this area.

Mr. SISK. I just wanted to call your attention to some of the statements you made in your statement discussing the Collbran theory with reference to costs on this project.

Mr. OLSON. Yes, sir.

Mr. SISK. Of course, you understand if we are going to use your theory expounded here, we certainly will oppose the upper Colorado project as well as all other projects generally in the West; is that correct?

Mr. OLSON. It probably would have that application to the upper Colorado; yes, sir. I happen to feel personally that the interest cost is a very real cost to the Government and the debt service is too big a cost at the present time, and the people who pay the taxes should know what this interest component factor is costing them. It is a very simple theory in arithmetic and compound interest that you double your construction costs in 50 years.

Mr. SISK. I am fully aware, of course, of their methods of figuring these projects. The point I want to bring out is simply that it seems that the committee, from time to time, is approached in testimony wherein the Collbran theory or some other type theory is fine for "me," but if for anybody else, it is a very bad situation and is going to wreck the Nation financially. Of course, that gets a little boring sometimes.

I think that is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Hosmer, if he has any questions.

Mr. HOSMER. I do not have any questions, Mr. Chairman, but I have a unanimous-consent request. These gentlemen have raised problems with respect to the supply of water available for transmountain diversion which I think are fundamental to the project. I have gone over the past reports on it and the statements of the witnesses from the Bureau, and I find nothing that would resolve this question, particularly in light of the statements in House Document 187 of the 83d Congress that the entire plan hinges on the execution of certain agreements with the reservoir companies.

Therefore, I will ask unanimous consent that the committee staff prepare for the benefit of the committee and the members of the committee and for the record of these hearings a summary setting forth in as detailed a fashion as possible the water supply situation, the legal availability of that supply, and any other pertinent data, information, or legal opinion with respect thereto as it relates to the possibility of this project insofar as its Fryingpan elements can be carried on.

Mr. ASPINALL. Reserving the right to object, the gentleman is aware of the fact that perhaps the best studies that have been made of that have been made by a firm of engineers in the gentleman's own community, Leeds, Hill & Co., and that the State of Colorado paid approximately $50,000 for that report.

Now what the gentleman has asked for, in the opinion of the Chair, is perfectly O. K. providing the gentleman limits his request to the extent of time and talent that this committee staff is able to give to this program. Otherwise it is a tremendous task that the gentleman suggests.

Mr. SISK. Mr. Chairman?

Mr. HOSMER. I understand that, but I also understand there is a tremendous amount of money involved here, and I do not want to be in the position of deciding on this project until I know whether there is water for it. And there has been no satisfactory testimony

before the committee that there is. There is only confusion, argument, and doubt, and I think it is not only proper, but a necessary request.

Mr. CHENOWETH. Mr. Chairman.

Mr. SISK. Mr. Chairman?

Mr. ASPINALL. I will yield to the gentleman from Colorado.

Mr. CHENOWETH. Reserving the right to object. I do not want to see my good friend from California deprived of any information that he is seeking, but I think the information he is referring to is already available. The report to which you refer is included in the Senate hearings as a part of the hearings.

Mr. HOSMER. Unfortunately, I am not a Member of the Senate. Or fortunately.

Mr. CHENOWETH. It could be very easily included here.

Mr. HOSMER. This is a matter before the House, and I do not think we ought to run all over the Hill for information on this thing since it is the responsibility of the committee to obtain it.

Mr. CHENOWETH. I think it could be very easily put in here, if it is satisfactory with the gentleman.

Mr. HOSMER. I want this committee staff to get busy and find out some of these things they ought to be finding out for us.

Mr. SISK. Mr. Chairman?

Mr. CHENOWETH. But——

Mr. ASPINALL. Just a minute. The Chair has control here. This committee has no jurisdiction over the staff. So with that understanding, the objection will be made from the Chair to the request of the gentleman from California. But the Chair will cooperate with the gentleman from California when the full committee next meets and see if we can arrive at some kind of a workable procedure in this respect. This Chair is in no position to tie up, or the committee is in no position to tie up the time of the staff. The full committee has jurisdiction.

What is it that the gentleman from California wants?

Mr. SISK. I simply want to go on record as objecting to that type of request, because, in the first place, I do not consider that the staff of this committee is in a position to make this particular type of study in view of the fact it has been made by reputable engineers, and I feel it is an unjust request on the part of this committee, as well as time-consuming, and would more or less place them in a position of taking sides in this particular argument. I would want to be on record as objecting to it.

Mr. HOSMER. A point of personal privilege, Mr. Chairman.

Mr. ASPINALL. The Chair would like to say he is entirely in sympathy with the gentleman from California, Mr. Hosmer. The Chair feels we should have that material and feels that we have not got it, but he does not feel that this committee has jurisdiction.

The Chair recognizes Mr. Hosmer.

Mr. HOSMER. Mr. Chairman, I have been accused of being unjust by a member of this committee, and I would like to speak to this point. I think you fairly well covered it. I do have an alternative unanimous consent request.

Mr. ASPINALL. The gentleman will state it.

Mr. HOSMER. To get the information from the Bureau. Let us get it from somebody.

Mr. ASPINALL. Will you limit the request to the best of ability——

Mr. HOSMER. I am not talking about the Hill report or the entire State of Colorado. I am talking about this particular project, the Fryingpan-Arkansas, and the 69,000 acre-feet of water that they claim they are going to get if something turns out right. Then the questions presented by these gentlemen this morning. In other words, let us get the facts and find out whether or not there is water there.

Mr. CHENOWETH. Mr. Chairman?

Mr. ASPINALL. What does the gentleman desire?

Mr. CHENOWETH. I reserve the right to object. We have not finished cross-examination, as I understand, of the Bureau of Reclamation officials, and they testified positively, and without any equivocation here, this week, that there was water available in this area for this diversion project. I do not know what else the gentleman wants.

Mr. HOSMER. I have the testimony here, and I wish you could show it to me.

Mr. CHENOWETH. I asked particularly about that, because I am as much interested as the gentleman from California. Certainly we are not here advocating a project when the water is not available for it. I do not think we can be that silly, and I resent the implication of the gentleman that we are trying to do so, and I object.

Mr. HOSMER. Mr. Chairman, if that is the case, I see no sense in my taking any further part in these hearings, because there is no valid basis upon which I or any other Member of Congress could possibly evaluate the expenditure of some 169 or 170 or 200 million dollars of the American people's money. And if I cannot get the information, the Congress cannot get the information, I do not know what the step to take is now, but I certainly do not believe it is worth while to waste my time here.

(Mr. Hosmer left the committee room.)

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Sisk.

Mr. SISK. Mr. Chairman, in view of the fact that my colleague from California made a point of personal privilege, I wish to state for the record that I did not accuse him personally of any injustice. I sincerely felt that the particular request would be unduly burdensome on the staff, and for that reason I want to clarify the statement that I made previous to this time.

Mr. ASPINALL. You have that right.

Mr. OLSON. Mr. Chairman?

Mr. ASPINALL. Yes.

Mr. OLSON. We would like to make a correction in the record. We introduced as enclosure 6 to Mr. Gerbaz' statement a map taken from the Colorado Rural Electric News for April 1955, showing thousands of new acres which would bloom with this water. The State manager of the Colorado State Association REA Cooperatives, Mr. Vance Austin, has told me during the recess that this publication was in error and that it has been repudiated in the May issue of the same magazine. So we do not want that in and would like to withdraw it and want the record to stand corrected.

Mr. ASPINALL. You have the permission to correct the record.

Mr. CHENOWETH. Does the gentleman from California still have the floor, Mr. Chairman?

Mr. ASPINALL. No.

Mr. CHENOWETH. I would like to ask one further question.

Mr. ASPINALL. The gentleman from Colorado.

Mr. CHENOWETH. In answer to a question, Mr. Olson, from Mr. Sisk, you indicated this apprehension concerning the proposed large project, which is in the future, you say, sort of a nebulous thing you cannot quite put your fingers on. Have you heard anyone connected with this project in any way advocate such a project in recent years since this project has been agreed upon?

Mr. OLSON. Yes.

Mr. CHENOWETH. I would be glad to have that information.

Mr. OLSON. Page 125 of Secretary McKay's report of February 1954 certainly raises that question, wherein it states:

In addition to the Fryingpan-Arkansas project diversions, the ultimate development plans for the Gunnison-Arkansas project would include diversions from Crystal River and Difficult, Castle and Maroon Creeks, all of which are tributaries of Roaring Fork.

Mr. CHENOWETH. What is that document you are reading from?

Mr. OLSON. Cliffs Divide project, Colorado; Status Report, February 1954; United States Department of Interior, Douglas McKay, Secretary, Bureau of Reclamation, W. A. Dexheimer, Commissioner.

Mr. CHENOWETH. All that is then is a statement that sometime perhaps in the future there might be such a project.

Mr. OLSON. Well, in view of——

Mr. CHENOWETH. I asked you specifically: Has anyone connected with this Fryingpan-Arkansas project advocated, since the approval of the Fryingpan-Arkansas project, the Gunnison-Arkansas project, this large project to which you refer? Was it not specifically agreed on in the operating principles there would be no further federally financed transmountain diversions until this exhaustive survey Mr. Stewart referred to was made?

Mr. OLSON. My recollection of the agreement was this would not establish any recognized precedent, but that certainly does not keep the eastern slope from coming back and making a good fight for it.

Mr. CHENOWETH. Has anyone started to make such a fight or intimated such a fight was going to be made or contemplated at all?

Mr. OLSON. Well, sir, when we were trying to figure out how much water was left to go over the mountain, after looking over the Twin Lakes decrees and the Highline decrees, and considering the shortages apparent, at least in issue, lower down the river, we began to wonder what would happen if you did not have water to run this expensive project on the other side of the mountain. And it seems so logical for you to come back and get a few more thousand acre-feet along the lines of the Gunnison-Arkansas project which has been so carefully documented.

Mr. CHENOWETH. You are going right back to where we started from. The Bureau and the Colorado Water Conservation Board independently found the water is there. So you see you answer yourself.

Mr. OLSON. The board told Mr. Stewart last week—who is the source of the information?

Mr. STEWART. I believe that was in the office of the Colorado Conservation Board, either that or the water board. That there would have been available for diversion under the Fryingpan-Arkansas project 19,000 acre-feet of water last year.

Now the thing that impresses me on this—and I am certainly not an engineer and not a water expert—but it seems to me with these collection areas at 10,000 feet in elevation, that it is going to be difficult to obtain 69,000 acre-feet of water through those collection sources. The city of Denver on the Blue River had originally planned a canal system for collection. They have revised that since 1921 3 or 4 times. The ultimate project that they now have, I believe the one they feel would best serve their interests, is a collection reservoir on the Blue River at Dillon. As I understand it, it was felt by engineers that the collection canals would be inadequate because of maintenance and so forth to provide water that they needed.

Mr. CHENOWETH. Were you here Monday when the Bureau of Reclamation officials testified?

Mr. STEWART. No, sir.

Mr. CHENOWETH. They testified positively that these canals would carry the water. Mr. Powell, who is the Bureau engineer in the area, in Pueblo, who designed the project, so testified. Other officials of the Bureau of Reclamation answered the questions that you have raised, and stated without equivocation that the physical aspects of the project are feasible.

Mr. STEWART. Pardon me. What is the size of the bore?

Mr. CHENOWETH. Of the bore?

Mr. STEWART. Of the tunnel. Of the bore. How much will it carry?

Mr. CHENOWETH. I do not have that information before me.

Mr. STEWART. In second-feet, how much will it carry?

Mr. CHENOWETH. I do not have that information.

I am informed by Mr. Powell it is 900 second-feet.

I believe that is all, Mr. Chairman.

Mr. ASPINALL. The Chair——

Mr. GERBAZ. Mr. Chairman, if that is all, on behalf of the committee from the western slope we wish to express our thanks.

Mr. ASPINALL. Just a minute. The Chair wants to ask you a question.

Mr. GERBAZ. Pardon me.

Mr. ASPINALL. I do not know whether I understood the statement of either you or Mr. Stapleton to the effect that, if you could be assured that your present rights would not be interfered with and that your potential rights on the ranges and on the farms which you now have would not be interfered with, then you would go home in a DC–7 immediately. Is that correct?

Mr. GERBAZ. If it would not impair the future growth that we expect in western Colorado, especially down in your section; that the western slope is absolutely protected and guaranteed, then we could not have any objection.

Mr. ASPINALL. In other words, if this water were really found to be surplus water which could be spared in that area, related to the rest of the main stem of the Colorado River, then your opposition would naturally fade away?

Mr. GERBAZ. As long as we are guaranteed we would have all the water we need on the western slope for all of the western slope; yes, sir.

Mr. ASPINALL. Mr. Stapleton, do you feel the same way?

Mr. STAPLETON. Speaking for myself, I certainly would not want to interfere with any progress on the eastern slope. We certainly

want to hold enough water in western Colorado for its further development as far as possible, and that is the reason we came out here to Washington for the purpose of protesting this Fryingpan-Arkansas diversion.

Mr. ASPINALL. Your position is that the western part of Colorado has just as much right to look toward the development of its potential resources as any part of the eastern slope?

Mr. STAPLETON. I certainly do.

Mr. ASPINALL. The Chair would suggest that you gentlemen get a copy of the operating agreement and with your attorney familiarize yourselves with those operating principles. The Chair would ask unanimous consent at this time that he be permitted to make a statement including whatever material that you wish to forward to the Chair relative to your position on the operating agreement, because the Chair feels that the representatives of western Colorado, and the Roaring Fork area especially, should have the right, and perhaps the responsibility, of giving some kind of a reaction to the particular operating agreement entered into by the authorities of Colorado.

Mr. STAPLETON. We will do that, sir.

Mr. ASPINALL. You will do that?

Mr. STAPLETON. Yes.

Mr. ASPINALL. I ask unanimous consent that, when received, it be made a part of the record at this place.

Mr. CHENOWETH. May we have some time limit on that?

Mr. ASPINALL. I would like to have it within 3 weeks.

Hearing no objection, it was so ordered.

(The information referred to follows:)

ASPEN, COLO., *June 13, 1955.*

Hon. WAYNE N. ASPINALL,
Chairman, Subcommittee on Irrigation and Reclamation
of the Interior and Insular Affairs Committee,
House of Representatives, Washington, D. C.

DEAR MR. ASPINALL: On behalf of the opponents of the Fryingpan-Arkansas project (H. R. 412), Orest Gerbaz, William C. Stapleton, and Clinton B. Stewart, witnesses who testified before your committee on May 12, 1955, the following comments are respectfully submitted with respect to the operating principles for the Fryingpan-Arkansas project. The comments are being submitted paragraph by paragraph and where there is an omission of a numbered paragraph, it is felt there is no comment needed.

PREAMBLE

The preamble is unacceptable because the report refers to "other tributaries of the Roaring Fork" without defining which tributaries are contemplated to be used for diversion purposes.

PREAMBLE—PARAGRAPH B

The declared policy of the State of Colorado is that water requirements in western Colorado, both present and future, shall be met before there can be any transmountain diversion. The Fryingpan-Arkansas project is contrary to this policy because it does not provide protection for water requirements presently adjudicated or for future beneficial purposes.

PARAGRAPH 2

This paragraph is unacceptable for the reason that it merely provides for the construction of the Aspen Reservoir with an active capacity of about 2,800 acre-feet, without providing for filling of said reservoir, but to the contrary merely states that this reservoir shall have only " a reasonable expectancy" of being filled annually. This does not provide replacement water for western Colorado.

PARAGRAPH 4

This paragraph means nothing. It provides for the completion of the dam prior to diversion to the eastern slope, however, it does not guarantee that this reservoir will be filled to provide replacement water as required under section 1, chapter 192, Colorado Session Laws, 1943, referred to in paragraph 5 following.

PARAGRAPH 5

The legislative intent must have been that the purpose of the quoted portion of section 1, chapter 192, Colorado Session Laws, 1943, was to bring into harmony the replacement storage to be provided and the amount of water actually diverted from the Colorado River Basin. Under this project the 69,000 acre-feet of water to be actually diverted bears no reasonable relationship to the replacement capacity of 2,800 acre-feet in the Aspen Reservoir, therefore, the very spirit of the Colorado law is violated by the operating principles.

PARAGRAPH 6

The replacement capacity of the Aspen Reservoir is insufficient to meet the definition of replacement capacity and the requirements as defined in this paragraph. Paragraph 6 is an admission that replacement water should be equal to the actual amount of water diverted plus a sufficient amount to compensate for the loss of return flow through diversion.

PARAGRAPH 7

In view of the provisions of paragraph 6, it is impossible for the United States or any water administrator to determine what proportion, if any, of the Aspen Reservoir constitutes surplus water. A literal reading of paragraphs 5 and 6 would only allow water in the Aspen Reservoir to be construed to be replacement water without other qualifications.

PARAGRAPHS 9 AND 10

We do not feel that the minimum flows established for the Fryingpan and Roaring Fork Rivers under paragraphs 9 and 10 are adequate to protect recreational values. That portion of paragraph 10 referring to the Twin Lakes Reservoir & Canal Co. and its diversion of water in effect opens up an opportunity for Twin Lakes to obtain its full adjudication of water even when ordered to close its headgates at the headwaters of the Roaring Fork, by obtaining water from the Fryingpan project free of charge to the benefit of the Twin Lakes Co. at the expense and detriment of the project and the taxpayers. This paragraph as it pertains to the Twin Lakes Co. together with other features of this project make possible an opportunity for the Twin Lakes Co. to sell 10,000 acre-feet of water to the city of Colorado Springs for the sum of $3,500,000, while said company may receive from the project replacement water of 10,000 acre-feet which it will use to satisfy its present commitments to water lessees on a profit basis.

PARAGRAPH 15

The inadequate capacity of the Aspen Reservoir for replacement purposes renders paragraph 15 valueless to water users in western Colorado for the reason that it is only reasonable to believe that the curtailment of project diversion would occur during the summer at a time when little water is available and no water would be available for storage purposes in the Aspen Reservoir. Due to extensive diversion, senior water rights to the project will find themselves in serious jeopardy during the latter part of July, all of August and September, because of the inadequate storage and loss of return flow.

PARAGRAPH 17

This paragraph assures western Colorado of nothing more than a minority position on the commission created therein. The western slope should be entitled to 50 percent of the members of this commission and a majority of the western Colorado membership should be appointed from counties which are the sources of diversion waters.

MISCELLANEOUS COMMENTS

1. We do not believe that the committee should take further action on the project until after an adequate survey has been made of the water available to this project at the diversion level, taking into consideration existing diversion rights, commitments under the river compacts and treaties in Colorado River Basin, present existing rights below the point of diversion, and future potential development in western Colorado.

2. For the benefit and edification of the committee, we would request the committee to solicit the report of Clifford Jex, consulting engineer, which has recently been submitted to members of the Colorado River Conservation Board for their consideration. As of this date, the board has not had opportunity to accept this report at a meeting. The name of this report is Report of Colorado River Water Supply and Long-Time Regulatory Storage, May 1955.

Respectfully submitted.

CLINTON B. STEWART.

BARNARD & BARNARD,
Granby, Colo., May 27, 1955.

Mr. W. C. STAPLETON,
County Clerk and Recorder, Aspen, Colo.

DEAR MR. STAPLETON: This letter is being written pursuant to our conversation of yesterday, in which you and Mr. Gerbaz informed me that the Irrigation Subcommittee of the Interior and Insular Affairs Committee of the House of Representatives desires comment from the Pitkin County people upon certain so-called operating principles, which form a part of Senate Document 106, applicable to the proposed Fryingpan-Arkansas project. Herein I desire to give you some of my thoughts on this subject, in the hope that they may be of some assistance to you in preparing the statement you propose to submit to the subcommittee.

I do not have at hand a copy of Senate Document 106, and in writing this letter I am referring to House Document 187 of the 83d Congress, 1st session, which is a letter from the Acting Secretary of the Interior to the Speaker of the House of Representatives, transmitting a report on the above project. I do not believe there are any differences between the operating principles as they appear therein and and as reflected by Senate Document 106.

The operating principles are set out in considerable detail. To analyze each part thereof sufficiently to make any intelligent adverse comment would require a very considerable period of time, and the study of engineers, hydrologists, and attorneys. Such a study might be justified were it not for the fact that, in my opinion, one fundamental part of the operating principles destroys the other and renders the entire document misleading. This is what I mean:

Subparagraph (b) of the introductory portion of the operating principles, as contained in House Document 187, provides that the project contemplates "(b) The protection of western Colorado water uses, both existing and potential, in accordance with the declared policy of the State of Colorado."

The declared policy of Colorado referred to, as I understand it, is a policy adopted by the Colorado Water Conservation Board in January 1951, in a resolution adopted by the board at that time. I do not have in my possession a copy of that resolution. I am sure Mr. Robert Delaney has one, and I suggest that you secure it from him to get the exact wording. The purport of it is that water requirements in western Colorado for all beneficial purposes, both present and future, shall be met before there be any transmountain diversion. This, of course, is as it should be. No good reason exists, in my opinion, for any modification of or departure from that expressed policy; and Senate Document 106, or these operating principles, say just that.

In paragraph 5 of the operating principles it is stated that any works or facilities planned, designed, or constructed for the exportation of water from the natural basin of the Colorado River by means of this project are to be subject to the following specific conditions:

"That any such works or facilities shall be designed, constructed, and operated in such a manner that the present appropriations of water, and in addition thereto prospective uses of water for irrigation and other beneficial consumptive-use purposes, including consumptive uses for domestic, mining, and industrial purposes, within the natural basin of the Colorado River in the State of Colorado, from which water is exported, will not be impaired nor increased in cost at the expense of the water users within the said natural basin; and

that the facilities and other means for the accomplishment of said purpose shall be incorporated in, and made a part of, any project plans for the exportation of water from said natural basin in Colorado."

At this point let me again call attention to the matter of subsidy to irrigation comprehended in these reclamation projects. Such subsidy in the Fryingpan-Arkansas scheme amounts to approximately $1,735 per acre, or at least that was the amount of subsidy wrapped up in the 1954 version of the Fryingpan-Arkansas project; and while the estimated cost of construction of the project comprehended in the present pending bill is somewhat less than that included in the 1954 measure, I know of no reduction in the amount of that subsidy.

If you will refer to my letter of March 31 to Fred McLaughlin, of which I send you herewith a copy, you will find an analysis of the Hill report, which is accepted as a Bible by Eastern Slope diversionists, and the conclusion expressed by Mr. Hill, found on page 3 of my letter, which I again quote:

"Should subsidies as great as $600 per acre be permitted (in western Colorado development) the resulting stream depletion at sites of use might reach 800,000 acre-feet per year. If there should be no limit upon subsidies to irrigation, then the entire surplus available to Colorado could be consumed by irrigation of new lands."

I want to again emphasize the last sentence of the above-quoted portion of the Hill report, in which it is flatly said that if there be no limit upon subsidies to irrigate. in the matter of western Colorado development, the entire so-called surplus of water in the Colorado River could, and I would say the word should be "would," be consumed by irrigation of new lands. Mr. Hill, you will note, does not say that that surplus conuld be consumed by beneficial uses on the western slope, such as for industrial purposes, increase in population, etc., but specifically limits his comment to the irrigation of new lands.

As I stated in my letter to Mr. McLaughlin, I do not agree with Mr. Hill's figures I think they show a greater so-called surplus than there is in the river In this respect, I invite your attention to a report made to the directors of the Colorado River Water Conservation District by Mr. C. H. Jex, dated May 1955, of which Mr. Gerbaz has a copy. While Mr. Hill fixes the amount of water available to Colorado under the 1922 and 1948 compacts at 3,100,000 acre-feet per year (see the second page of the letter of transmittal dated October 31, 1953, forming a part of the so-called Hill report), Mr. Jex fixes it at 2,680,000. This figure, in my opinion, has a far better factual basis than the one used by Mr. Hill.

On the same page of the same letter of transmittal, Mr. Hill reaches the conclusion that "the present uncommitted surplus which can be relied upon for use in Colorado is thus 1,450,000 acre-feet per year. As opposed to this figure, Mr. Jex's report fixes the uncommitted surplus at 880,000 acre-feet. Again I say that Mr. Jex's figure is supported by far stronger and more reliable evidence than is Mr. Hill's. On a basis of a subsidy of $600 per acre, as reflected by the Hill report on page 35, 800,000 acre-feet of this amount will be consumed in western Colorado for irrigation purposes alone, leaving only 80,000 to meet the requirement of 300,000 acre-feet for the production of oil from oil shale (for this amount, see the second page of the letter of transmittal forming a part of the Hill report). Thus, we already have a deficit of 220,000 acre-feet in the amount of water which will be required in western Colorado; and we again refer to the water policy of the State of Colorado, which Senate Document 106 says specifically is to be protected in the construction and operation of the Fryingpan-Arkansas project.

By what kind of legal or engineering legerdemain can this anomalous result be attained? Frankly, I am not smart enough to figure that one out. It is for this reason that I say that the Colorado water policy of January 1951 cannot be protected and this project be designed, constructed, and operated in such a manner that the present appropriations of water and, in addition thereto, prospective uses of water for irrigation and other beneficial consumptive use within the natural basin of the Colorado, remain "unimpaired." To reduce my contention to the simplest kind of language, it is this:

Even under the calculations of the Hill report, and certainly under the figures presented in the Jex report, for every acre of land which is irrigated by means of the Fryingpan-Arkansas project, one acre of land or more in western Colorado, now unirrigated, will forever remain in sagebrush or greasewood. If any man, however learned he may be or however facile and alert his mind, can reach any other or different conclusion, I should like the opportunity to shake his hand and compliment him upon his mental prowess.

I am reminded of a story of a man who was invited to a poker game. He declined, saying that he had three good reasons why he should not take part. When questioned about those reasons, he replied, "Well, the first is that I am broke." His questioner then said, "To hell with the rest of the reasons."

The fact that the so-called operating principles are made completely meaningless and futile by reason of the inescapable conclusion that there isn't any water available for the Fryingpan-Arkansas project without stealing it from what western Colorado must have if the Colorado water policy is to be adhered to, places us in the position of saying, as did the man's poker friend, "To hell with the rest of the operating principles."

I am given to understand that a representative of the Southwestern Colorado Conservation District appeared before the subcommittee and testified favorably with regard to the Fryingpan-Arkansas project. Apparently he did so on the completely erroneous assumption that what happens to the Roaring Fork and Fryingpan Rivers will not affect the Dolores and San Juan. That conclusion is completely fallacious. The Dolores and San Juan waters make up a part of the 880,000 acre-feet of water in the Colorado system which Mr. Jex tells us is available for all of Colorado. There is just so much water in this jug, and if any part of it is given away, it leaves just that much less in the jug for Western Slope people to drink, and it does not make and difference whether they want to drink it out of the Yampa, the White, the Gunnison, the San Juan, the Dolores, or Tomichi Creek.

I hope that what I have said in this letter will be of some assistance to you. I have taken the liberty of quoting from Mr. Jex's report only because Mr. Gerbaz, as a member of the Colorado River Water Conservation District board of directors, has been supplied with a copy thereof. It is quite possible that Mr. Jex may have some explanatory comments to make which would be of assistance to you. I suggest that Mr. Gerbaz talk to him before any of the information in his report is presented to the congressional committee. I can conceive of no reason why he would object; but some reason may exist, and I don't want to subject him to criticism.

Regardless of what may be the attitude of other residents of the Western Slope toward the Fryingpan-Arkansas project, I am completely and unalterably opposed to it. If those birds in the Arkansas Valley want to avail themselves of water of the Arkansas River which has been wasted, and want to construct facilities so to do, I am for them; but it makes me see red when they attempt, by misrepresentation of facts and by every other subterfuge known to man, to steal our water.

If I can be of any further assistance to you people in Pitkin County, please feel free to call on me.

Yours very truly,

JOHN B. BARNARD.

Mr. ASPINALL. The Chair and the committee wishes to thank you gentlemen for appearing here at this time and making your statements in order to protect your own area, your own interests, and we feel that you have made a fine contribution to these hearings. Thank you very much.

Mr. GERBAZ. Mr. Chairman, on behalf of the Colorado delegation from Pitkin County, I want to thank the chairman for his very, very fair way he has heard this Fryingpan-Arkansas debate. I want to thank every member of the committee, and even of the opposition. They were more gentlemanly with me this time than they were the other time. Thank you very much.

Mr. ASPINALL. At this time, before we recess, the Chair asks unanimous consent to place in the record at this place a telegram, in opposition to the legislation, signed by E. R. Thomas, president of the First National Bank of Grand Junction, Colo.

Mr. CHENOWETH. Mr. Chairman, I would like to make a unanimous consent request.

Mr. ASPINALL. Please wait until I get through with mine.

Mr. CHENOWETH. I am sorry.

Mr. ASPINALL. Is there any objection to the request?

Hearing none, it is so ordered.

Also a telegram from Norrie Colony, Inc., signed by Howard H. McMullin, Secretary, addressed from Grand Junction, Colo., in opposition to the legislation.

Also a telegram from Joseph C. Weber, superintendent of schools at Leadville, in which he reqeusts that some provision be made to protect their school facilities at Leadville, Colo., in case construction starts in that area.

Is there any objection?

Hearing none, it is so ordered.

(The telegrams referred to follow:)

GRAND JUNCTION, COLO., *May 11, 1955.*

Hon. WAYNE N. ASPINALL,
Chairman, Irrigation and Reclamation Committee,
House of Representatives, Washington, D. C.:

Being vitally interested in the future development of western Colorado we believe that our growth particularly in recent years justifies serious consideration to future needs for water on the western slope when there is a discussion of diversion to eastern Colorado. Before further diversions are approved eastern slope cities should explore fully the more efficient use of present water and purchase of privately owned water rights. Western slope should be compensated by adequate storage in connection with any diversion. We do not believe that these conditions have been met in the proposed Fryingpan-Arkansas project and are therefore opposed to it.

E. R. THOMAS,
President, First National Bank.

LEADVILLE, COLO., *May 9, 1955.*

WAYNE N. ASPINALL,
House Representatives, Washington, D. C.:

Disappointed. Your letter of March 27, 1952, promised opportunity to appear before committee on Fryingpan-Arkansas project. Present mining prices and resurrection closing permanently make it even more necessary to be protected on schools. Terms of any aid should be clearly specified and not general like section 6 of Trinity River development.

JOSEPH C. WEBER,
Superintendent of Schools.

GRAND JUNCTION, COLO., *May 10, 1955.*

Hon. WAYNE N. ASPINALL,
Chairman, Irrigation and Reclamation Committee,
House of Representatives, Washington, D. C.:

We are a cooperative group owning 14 summer homes on 160 acres of deeded land along Fryingpan River 22 miles above Basalt, Colo., from engineering, financial, and beneficial standpoints project is not feasible. Taking floodwaters only at 10,000 feet altitude has never been practical or demonstrated by Twin Lakes project and will only result in an extreme depletion of Fryingpan River during summer months. The cost to ultimate use is prohibitive for small amounts of water involved as shown by our comparison with other projects. This will result in no repayment and only add to Federal tax burden. Power by use of coal is much cheapel in this instance as there are many idle coal mines in Pueblo-Trinidad districts. New land on western slope can be irrigated for at least one-half the cost. We believe eastern Colorado should leave water needed for domestic and municipal purposes and not be used for irrigating farmlands.

We are emphatically opposed to the Fryingpan-Arkansas project and respectfully urge that favorable consideration be given our view.

NORRIE COLONY, INC.,
HOWARD H. MCMULLIN, *Secretary.*

Mr. ASPINALL. Now, Mr. Chenoweth.

Mr. CHENOWETH. Mr. Chairman, earlier in the hearing today a statement was submitted on this project prepared by Dr. E. T. Halaas, chairman of the division of finance and banking of the University of Denver, and I asked unanimous consent this be printed in the record.

Now our colleague Mr. Saylor has found something objectionable in this statement that he feels is some personal attack upon him, which I certainly do not want to be a party to. During the time I have been in Congress I have tried to follow the principle of not doing anything to hurt any other Member of Congress. I ask unanimous consent to withdraw my request that this report be printed in the record.

(Pursuant to the unanimous-consent request of Mr. Chenoweth, a statement by the proponents of the project on the operating principles follows:)

ANSWER TO ASPEN COMMENT ON OPERATING PRINCIPLES

We submit herewith the answer of the Water Development Association of Southeastern Colorado to the criticisms of the operating principles voiced in the letter of Mr. Clinton B. Stewart of June 13, 1955, and the letter of Mr. John B. Barnard of May 27, 1955, both of which have been filed with this committee.

The contentions advanced in criticism of the operating principles are:

1. Replacement storage requires that a drop of water be impounded in western Colorado for every drop diverted to eastern Colorado.

2. No water is divertible to eastern Colorado because none is available.

3. There is no guaranty that Aspen Reservoir, if constructed, will fill.

4. The Twin Lakes Reservoir & Canal Co. can profit at the expense of the taxpayers.

5. Fish and wildlife estimates of live streamflow required are inadequate.

Both Mr. Stewart and Mr. Barnard especially commend the work of Mr. Clifford Jex.

REPLACEMENT STORAGE

Director Clifford Stone, in his report to the Colorado Water Conservation Board of the work of the policy and review committee on the Fryingpan project, dated June 14, 1950, stated:

"To facilitate its review of the report, the committee appointed an engineering advisory subcommittee to study and consider the various engineering aspects of the Bureau report. The committee has reviewed and accepted two reports from such subcommittee. The subcommittee consists of Royce J. Tipton, consulting engineer, Colorado Water Conservation Board, chairman; Frank C. Merrill, secretary-engineer, Colorado River Water Conservation District Board, Grand Junction, Colo.; R. M. Gildersleeve, chief engineer, Colorado Water Conservation Board; C. H. Jex, area engineer, Bureau of Reclamation, Grand Junction, Colo.; Ben F. Powell, area engineer, Bureau of Reclamation, Pueblo, Colo.; and J. R. Riter, Head of Division of Hydrology, Branch of Project Planning of the Bureau of Reclamation, Denver, Colo."

At the meeting of the policy and review committee held January 3 and 4, 1950, as reported by the minutes thereof, appears the following:

"*Report of the engineering subcommittee*

"4. Mr. R. J. Tipton, chairman of the engineering subcommittee, read and explained the December 30, 1949, memorandum report of the engineering advisory subcommittee, a copy of which is appended to these minutes. There was considerable discussion of the results of the subcommittee's reviews and studies of divertible flows, replacement storage, power production, and fish and wildlife aspects of the initial phase of the project. Questions relating to these technical aspects of the plan were answered by Mr. Tipton and engineers of the subcommittee to the general satisfaction of the members of the policy and review committee. (The record of attendance shows present:

C. H. Jex, area engineer, Bureau of Reclamation, Grand Junction.) In answer to the chairman's question, Mr. Tipton informed the committee that the memorandum report was unanimously adopted by the engineering advisory subcommittee. * * * The committee was informed that the engineering advisory subcommittee considers the contemplated Hunter Creek extension to be a physically workable scheme and the provision of 28,000 acre-feet of active storage at the Aspen site to be adequate."

In the official minutes of the meeting of the policy and review committee held May 25, 1949, at which Mr. Jex was present, there appears the following:

"*Replacement requirements at Aspen (item b of the agenda)*

"11. Mr. Riter explained informally the revised studies made by him in collaboration with Engineers Jex and Powell, and in which Messrs. Tipton and Gildersleeve also participated as they were studying the problem in more detail. * * * He stated to the committee that Mr. Gildersleeve's study was based on daily discharge records and figures obtained by him were probably more precise than those obtained by the Bureau engineers for replacement purposes of the ultimate Twin Lakes and the initial phase Gunnison-Arkansas projects,[1] but that there was close agreement between the results of the two studies. A tentative summary of storage requirements at the Aspen Reservoir site, utilizing the results of both studies, was suggested by Mr. Riter to the committee as follows:

	Acre-feet
Replacement purposes:	
Ultimate Twin Lakes diversion	6,100
Initial phase Gunnison-Arkansas project	3,100
Difficult Creek [1]	2,100
Possible winter diversions by initial phase Gunnison-Arkansas project	5,000
Subtotal	16,300
Other purposes:	
Supply natural shortages at Aspen	6,100
Supply future industrial uses	1,700
Subtotal	7,800
Total for all uses	24,100

[1] No water will be diverted from Difficult Creek by the Fryingpan project; hence, no replacement capacity is required for this in Aspen Reservoir.

Attention is directed to the hearings before the Subcommittee on Irrigation and Reclamation, the Committee on Interior and Insular Affairs of the House, 83d Congress, 1st session, on H. R. 236, at page 117, wherein Mr. Royce Tipton made the following statement:

"The engineering advisory committee reviewed in detail the original estimates of water supply made by the Bureau of Reclamation and the manner of operating this project. It also made detailed original studies as to the amount of replacement storage capacity required on the Western Slope to permit the free operation of the project without adverse effect to Western Slope interests * * * The engineering advisory committee concluded that the gross water supply that could be diverted by the project would average 69,200 acre-feet."

At page 118, there is set forth the table of replacement capacity for Aspen Reservoir quoted above with this addition:

"Unassigned, 3,900. Total capacity, 28,000 acre-feet."

This is followed by a detailed explanation of each of the items, and, at page 119, Mr. Tipton stated:

"It was the conclusion of the engineering advisory committee, and it is my conclusion, that the 28,000 acre-feet of capacity to be provided for in the Aspen Reservoir is more than ample for replacement purposes."

Paragraph 5 of the operating principles quotes the phraseology of section 1, chapter 192, Colorado Session Laws of 1943. This statement is the official policy of Colorado relating to replacement capacity and was set forth verbatim in the

[1] Original reclamation studies encompassed diversions from the Gunnison River. These are not involved in H. R. 412. The "initial phase" or "Roaring Fork diversion" are synonymous with the Fryingpan-Arkansas project. The name has been officially changed.

operating principles so there could be no confusion. Having done so, it is inconceivable that the policy and review committee, composed of the 5 members of which 2 represented western Colorado, could unanimously have endorsed the operating principles and recommended their approval by the Colorado Water Conservation Board if the principles themselves were not in conformity with the policy of the State. Also, the Colorado Water Conservation Board, which contains several representatives of western Colorado, would never have approved these principles unanimously had the principles violated the State water policy regarding replacement storage. Mr. Jex is on record as having stated that 28,000 acre-feet capacity is more than adequate for replacement.

We submit that the criticism relating to replacement storage is unfounded.

WATER IS AVAILABLE

Divertible water, as that phrase is used in water parlance, means waters that are both legally and physically available. They are waters which can be diverted and used for beneficial purposes after all existing requirements have been met.

The committee is reminded that Mr. Tipton, as chairman of the engineering subcommittee, in reporting to the policy and review committee on January 3, 1950, emphasized the fact there had been considerable discussion of the subcommittee's studies on divertible flow and that its memorandum report was unanimously adopted by the engineering advisory subcommittee. Mr. Jex, along with other outstanding engineers of the area, certified that there was available for diversion to eastern Colorado out of the Roaring Fork River 69,200 acre-feet of water. The engineering committee knew that the results of their studies would be relied upon by representatives of both eastern and western Colorado. We submit that the record establishes that these waters are available and can be legally diverted without impairment of anyone's right.

Colorado Water Conservation Board representatives, testifying before this committee in connection with H R. 236, 83d Congress, and H. R. 412, 84th Congress, have repeatedly stated and emphasized that the waters proposed to be diverted by the Fryingpan project are well within the share of the State of Colorado and that there are more than ample waters available to satisfy the requirement of the project. Such certification has been made by Mr. Royce Tipton, Judge Clifford Stone, formerly director of the Colorado Water Conservation Board, Jean S. Breitenstein, now Federal district judge, Mr. I. C. Crawford, the present director of the Colorado Water Conservation Board, and, most recently, by the State official who is charged by law with the duty of administering the water rights of the rivers in the State of Colorado. Mr. J. E. Whitten, State engineer, on June 9, 1955, in response to a request from the Colorado Water Conservation Board, made an independent study and an independent certification which has been filed with this committee. Every official of Colorado has certified that there is ample water to supply 69,200 acre-feet annually to eastern Colorado.

ASPEN RESERVOIR WILL FILL

Mr. C. H. Jex, on March 4, 1949, prepared a memorandum, the subject of which was "Analysis of Water Supply—Roaring Fork River in the Vicinity of Aspen, Colo." Two tables are appended thereto, the second table being a summary of the operations study on the Roaring Fork River showing the undepleted flows. This study shows that in 1934, the dryest year of record, 10,600 acre-feet would have been adequate for replacement storage for Roaring Fork purposes. In that year, there was available for storage 23,300 acre-feet of water, or approximately twice the amount required for replacement storage by reason of the Fryingpan project. A study was made for the years 1931 to 1944, both inclusive. This indicates that in only 3 out of those 14 years were waters unavailable to fill Aspen Reservoir. An average of the total period shows 39,800 acre-feet annually available for storage. By the tabulation, it appears that in all but the driest of years there is a full supply, assuming Aspen Reservoir to be empty at the start of the season, and even in these years there is at least twice as much water available for storage as is required for replacement.

But even if this were insufficient, section 15 of the operating principles makes specific provision for such an unusual situation and gives a preference to Aspen Reservoir over waters diverted to eastern Colorado whenever a deficit is the result of demands under the Colorado River compact or the upper Colorado Basin compact, by providing:

"* * * Then the diversions by the project for use in eastern Colorado should be curtailed before there is any curtailment of the right to store water in Aspen Reservoir in quantities not in excess of the capacity of that reservoir for use in western Colorado in accordance with these operating principles."

TWIN LAKES

There is no possibility that the Twin Lakes Reservoir & Canal Co. can profit by reason of the building of the Fryingpan project. Section 10 of the operating principles provides that appropriate charges can be made should that company ever derive any benefit or advantages from the construction of Aspen Reservoir. It is the Aspen area that will benefit on a drop for drop basis by reason of the arrangements of the Twin Lakes. Whenever waters can be made available to the Twin Lakes Co. from other sources, it has agreed to forego asserting its legal rights to divert waters from the Roaring Fork River above Aspen whenever the remaining flows would be such as to imperil fish life. No such guaranty exists under present conditions. The building of the Fryingpan project will make possible this exchange. Not only does the Aspen area get the benefit of this exchange, but to the extent of 3,000 acre-feet annually the project is obligated to supply waters from sources other than the Roaring Fork in order to benefit the Aspen area. This means that there is 3,000 acre-feet of fish flow water available above the town of Aspen which would not otherwise be available.

Mr. Barnard states that to analyze the operating principles in order to make intelligent comment thereon would require a very considerable period of time and the study of engineers, hydrologists, and attorneys. Admittedly, no such study was made by Mr. Barnard. It is obvious that no such study has been made by Mr. Stewart, and it is equally obvious that neither Mr. Barnard nor Mr. Stewart have read the record of proceedings of the meetings of the policy and review committee or of its engineering advisory subcommittee. Had they done so, they would not repudiate the outstanding citizens of western Colorado who represented them in this matter, including Mr. C. H. Jex.

RECREATIONAL USES

We submit that this project has had very careful consideration by the most competent men available in the State of Colorado. Mr. Stewart states that he feels that the provision for minimum flows for recreational purposes are inadequate. Regardless of how Mr. Stewart may "feel," his feelings are not an adequate substitute for the considered study of hydrologists, engineers, and attorneys. He ignores the countless man-hours invested by the Federal Fish and Wildlife Service, the Colorado State Fish and Game Commission, engineers, attorneys, and outstanding citizens of western Colorado in determining the minimum requirements for this purpose.

It is respectfully submitted that none of the comments and criticisms of the operating principles are justified.

WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO,
Pueblo, Colo.

Mr. ASPINALL. Unanimous consent request has been made that the document referred to, known as the Fryingpan-Arkansas project, prepared by the Colorado Public Expenditures Council, be withdrawn as a part of the record. Is there any objection?

Hearing none, it is so ordered.

Mr. CHENOWETH. I understood it was submitted for the committee file.

Mr. ASPINALL. The request now has been made that it be made a part of the file. Is there any objection?

Hearing none, it is so ordered.

(The document referred to will be found in the files of the committee.)

Mr. ASPINALL. The committee will now stand in recess until 1:45, at which time the witnesses representing the water development association will be at the witness table.

(Whereupon, at 12:20 p. m., the subcommittee recessed to reconvene at 1:45 p. m., of this same day.)

AFTERNOON SESSION

Mr. ASPINALL. The subcommittee will be in session for the further consideration of the legislation which would authorize the Fryingpan-Arkansas project.

At this time the Chair recognizes the gentleman from Colorado.

QUESTION PERIOD OF CHARLES H. BOUSTEAD, HAROLD H. CHRISTY, DAMIAN DUCY, CHARLES J. BEISE

Mr. CHENOWETH. Mr. Chairman, I would like to address by questions to Mr. Christy. Perhaps Mr. Beise, Mr. Ducy, or Mr. Boustead will also want to participate in the answers.

Mr. Christy, you have been associated with this project a long time, and you are recognized as being an outstanding water engineer and leader in our State. The question has been raised about the availability of the water for the Fryingpan-Arkansas project. I think you ought to tell the committee something about the history of what has been done in the way of investigating the supply of water, what the reports have been, and what the present situation is.

I believe that you served as a member of the policy review committee?

Mr. CHRISTY. That is correct.

Mr. CHENOWETH. I think the committee would be interested in knowing who the other members were, something about your discussions, and the different reports that have been made on the availability of the water in this particular area for the Fryingpan-Arkansas project.

Mr. CHRISTY. First, Congressman, the Bureau of Reclamation, of course, in their report went into the water supply, and the report was submitted to the Colorado Water Conservation Board, at which time the Colorado Water Conservation Board appointed what was known as the policy and review committee. That committee was composed of Mr. Beise and myself, representing the eastern slope; Mr. Hume White of Eagle, and Mr. Frank Delaney of Glenwood Springs. We deliberated some 30 months in studying the project report the Bureau had submitted.

Mr. CHENOWETH. What was the date the committee was appointed?

Mr. CHRISTY. I think that was in the fall of 1949. Judge Clifford Stone, director of the water board, was also a member of that committee. And the fish and game commission were on that committee as well, and Colorado Springs had a representative. They were on the advisory committee, however, though.

And the report of the Bureau was submitted to that committee. That committee had an engineering advisory commitee, composed of the area engineers of region IV, the Salt Lake office located at Grand Junction, and the area engineer from region VII, Mr. Powell from the Arkansas Valley, Mr. R. J. Tipton, a consulting engineer for the Colorado Water Conservation Board being chairman of that engineering advisory committee. Frank Merriell of Grand Junction represented the Colorado River Conservancy District Board. Clif-

ford Jex happened to be area engineer for region IV. That group also had advisors from Colorado Springs and other places in the area.

That engineering committee brought in—analyzed the availability of the water supply in the proposed project and reported back to the committee.

Then the Colorado Water Conservation Board accepted the committee's report and recommended the project.

Subsequent to that, I served on what was known as the conference committee, which was established by the Colorado Water Conservation Board in an effort to resolve the east-west slope problems in Colorado. That committee hired the firm of Leeds, Hill & Jewett of Los Angeles, Mr. Raymond Hill being the prime contact man with that committee. He investigated the resources and the water supply in western Colorado and made his report to the water board.

Yesterday the director of the Colorado Water Conservation Board, Mr. Ivan Crawford, testified that within the past few months the chief engineer, Mr. Gildersleeve, of the Colorado Water Conservation Board—who, incidentally, was a member of that engineering advisory committee as well—that the water board had made an additional evaluation as to the availability of the water supply, and he testified that in their opinion the water supply was adequate for this project.

Mr. ASPINALL. Will the gentleman yield?

Mr. CHENOWETH. Yes.

Mr. ASPINALL. Mr. Christy, do the results of the investigation held by the Bureau of Reclamation, the results of the study by the Colorado Water Conservation Board, and the Leeds & Hill report all agree on the amount of water that is in the upper basin and is said to be present for usage in the average year and is the amount surplusage to the needs of the upper basin?

Mr. CHRISTY. Mr. Chairman, I think they agree in principle as to the flow at Lee Ferry. There are some slight discrepancies in each one of the tabulations in the total. They are of no serious magnitude. However, they all agreed that the water supply was available in this area for the Fryingpan project.

Mr. ASPINALL. That is the question I wanted answered. Thank you.

Mr. CHENOWETH. Go ahead, Mr. Christy.

Mr. CHRISTY. That without injury in western Colorado.

I would like to state a little further that in evaluating the water supply available, this engineering advisory committee submitted a report to the members of the policy and review committee, in which we had evidence to indicate that they had provided a water supply for the full amount of the vested water rights in the project area, and also provided sufficient water for the lands that have been classified in that area as being irrigable.

I would like to mention specifically the Salvation ditch which was mentioned this morning. As I recall, the witness testified the diversion had been 30 feet. It is my recollection that the advisory committee stated it was on the order of 26. There is no great discrepancy in that figure. Whereas the decree in the courts for that ditch is 96 cubic feet per second of time. That ditch was considered, or that water right was considered as being vested and had to be protected in its entirety in the planning of this project.

Mr. CHENOWETH. You did not disturb any vested water rights in this project?

Mr. CHRISTY. I call your attention to the fact that the basic Reclamation Act provides that the water laws of the States in which they are working must be recognized, and I am very much of the opinion that in operations of the Fryingpan-Arkansas project the vested rights in western Colorado, as well as eastern Colorado, will have to be observed.

Mr. CHENOWETH. Do you know of any basic reclamation laws that are being violated in this project?

Mr. CHRISTY. No, sir.

Mr. CHENOWETH. What did these reports reveal, Mr. Christy, as to the availability of the water for this project?

Mr. CHRISTY. I included in my general statement that 90 percent of the water to be diverted by this project was to be diverted in the months of May, June, and July; and approximately 90 percent of that amount came off in some 45 days of time. In other words, the water to be diverted by the project is only that flash snow runoff in the early spring months, of any quantity of magnitude. There will be, or could be, some small diversions during other months of the year, depending on the flow conditions of the stream and the call for water by the vested rights on the stream.

Mr. CHENOWETH. You have personally been over this area many times, have you not, Mr. Christy?

Mr. CHRISTY. Yes, sir, and I might state that the Highline Canal water rights were mentioned this morning——

Mr. CHENOWETH. Tell us something about those rights.

Mr. CHRISTY. The Highline ditch in the Arkansas Valley now owns what is known as the Buskin-Ivanhoe diversion project, or the Carleton diversion project. That is a project which utilized the Buskin-Ivanhoe tunnel through the Continental Divide some 1,000 or 1,100 feet above the proposed elevation of the proposed diversion tunnel for the Fryingpan-Arkansas. There are collecting ditches leading from the north and south of the west portion of the Buskin-Ivanhoe tunnel. We have stored in our Sugar Loaf Reservoir since 1926 the water diverted by this project. The diversions were ranges from 3,000 to 7,700 acre-feet annually. I think 7,700 will be about the maximum a year within a few hundred one way or the other.

I have always thought of that diversion as being on the order of 5,000 acre-feet annually.

There are two reasons for the diversion being limited:

One. The capacity of the facilities through the tunnel. And the old tunnel has many caves in it. And the water is transported in a flume and piped through that tunnel, but the drainage area, intercepted by these ditches, is limited and will not deliver for any long periods of time the amounts indicated in the court decree in cubic second-feet, as testified this morning. There is no question that for a short period of time or a few hours, on maybe numerous occasions the total amount of those decrees might actually be diverted, but not for any long continued period of time.

If the diversions were possible, they would have been made in the past because that was a supplemental supply to several ditches under which the Carleton interests had contracts, and in two instances sugar-

beet factories were located under those ditches, and it was the water from this diversion that made the growing of beets possible. Winter diversions by that ditch have been made, varying of course from year to year. Actually during the month of February 1955, I received official authorization from the division irrigation engineer, a State official, to capture an extra amount of acre-feet per week as the diversions are being made.

Mr. CHENOWETH. You say it runs from 3,000 to 5,000?

Mr. CHRISTY. Sir?

Mr. CHENOWETH. You say it runs from three to five thousand?

Mr. CHRISTY. The total diversions annually by those decrees under that Buskin-Ivanhoe or Carleton tunnel project have ranged from 3,000 to 7,700, the average being about 5,000 acre-feet annually.

Mr. CHENOWETH. I would like to have you tell the committee something about this water for replacement, and just what the provisions are you have made to see that the rights of the western-slope users are fully protected.

Mr. CHRISTY. Replacement storage is provided in this project and required under the Conservancy District Act under which this project will have to be built, by reason of the agreements in the operating principles between eastern and western Colorado. That replacement is storage which would permit diversions at one point on the drainage when a senior appropriator at a point below the reservoir had a call for water and the water could be turned out of the reservoir to protect that appropriation without interfering with it. There is nothing in the Colorado statutes that calls for an acre-foot replacement for each acre-foot diverted to eastern Colorado.

In this project, and in the hearings before this committee, testimony on H. R. 236, you will find the statement by Mr. H. J. Tipton, who I have stated was chairman of this engineering advisory committee, in which it indicates that the replacement storage required for the summer-month diversion was in the order of 3,000 acre-feet. Should winter diversions be made, the replacement requirements could amount to as much as 5,000 acre-feet, making a total replacement capacity in the Aspen Reservoir on the order of 8,100 acre-feet. You will note that the Aspen Reservoir has the capacity of approximately 28,000 acre-feet.

It was agreed by the water users, by their representatives on the policy and review committee, that due to the small number of good reservoir sites, particularly at the high altitude, that the site should be built to its ultimate usefulness, and that the limiting factor be that rather than the replacement.

Actually, there is in the order of 16,000 acre-feet capacity in the Aspen Reservoir which will be available for firming up existing and future rights in western Colorado on the Roaring Fork below the Aspen Reservoir during the months of August and September when they do have shortages of water in that area. In other words, the Salvation ditch that was mentioned this morning, the streamflow by nature is not affected by man-made diversions, is too low to supply the decreed water right during the late month of August and early September.

During many years, as I recall the testimony of the engineering advisory committee, it was anticipated by the study of the records

that the expectancy was that the Aspen Reservoir would fill every year by 2 in a 31-year streamflow record they utilized.

Mr. CHENOWETH. Every year but two?

Mr. CHRISTY. That is my recollection.

Mr. CHENOWETH. In other words, the water users below the Aspen Reservoir are going to be protected and be assured of water even in the dry years?

Mr. CHRISTY. That is right, sir. Mr. Beise, as I recall, this morning mentioned that the Aspen Reservoir was located at Aspen at the request of the water users and the water experts in western Colorado and not at the request of those under the project in eastern Colorado.

Mr. CHENOWETH. Mr. Christy, this one further question and then I want my colleagues to have the time.

It was mentioned this morning and certain witnesses indicated some criticism of the water users in the Arkansas Valley on the eastern slope for not going ahead with the development of the Arkansas Valley first before resorting to transmountain diversion. Now can you tell us just what has been done in the exploration of those possibilities and what the findings have been?

Mr. CHRISTY. Mr. Chenoweth, I am fearful that that impression is brought about by lack of our knowing our neighbor's problems. The Arkansas River has long been overappropriated, and in addition to the decrees and vested water rights belonging to the people in Colorado we have the effect of the Colorado-Kansas compact on the Arkansas River, which precludes any increase in use of the waters of the Arkansas River except those that are set up as provided and conserved by the Fryingpan-Arkansas project and Pueblo Reservoir on the order of 50,000 acre-feet annually, which would be water that would normally spill from John Martin Reservoir in order to comply with the terms of the compact. That reservoir is a very costly reservoir because of the necessity of moving a mainline railroad. It is not a single-purpose project. I assure you that the people in the Arkansas Valley would have built that reservoir long since if it could have been built under a single-purpose project. Pueblo Reservoir, which is the terminal reservoir in this project plan, which provides long-term holdover storage for the flash floods that occur that would normally spill from John Martin, also provides for the reregulation of the winter flows, and in addition the withholding of water from dry to wet cycles in order to conserve the native waters of the river.

In fact, this project, in my opinion, being a multipurpose project in nature, does exactly what has been suggested should be done, but to make it feasible it takes the small transmountain project coupled with the power, flood control and reregulation to make the project feasible.

Mr. CHENOWETH. Thank you very much, Mr. Christy.

Mr. Ducy, do you have any comments to make?

Mr. DUCY. No. I concur with Mr. Christy's testimony.

Mr. CLRISTY. I might add this: That the official report of the State of Colorado will indicate that there are small diversions during every month of the year made by the Independence Pass transmountain diversion as well.

Mr. CHENOWETH. Mr. Boustead, do you have anything to add?

Mr. BOUSTEAD. No.

Mr. CHENOWETH. Mr. Beise, do you have anything?

Mr. BEISE. This, Mr. Chenoweth: We were vitally interested in building the smallest possible project that was feasible. When I say "we" I mean the people of the Arkansas Valley were very instrumental in reducing the so-called one-time Gunnison-Arkansas down to the Fryingpan-Arkansas project. It conforms to existing reclamation law. We asked for an 8-year construction period and within a few months of the 50-year repayment period.

There is a minimum of flood control appropriation. There is not an excessive investment in power revenues in proportion to the yields and the returns.

There are very few projects, Mr. Chenoweth, today that have anywhere near the repaymentability of the Fryingpan-Arkansas project.

I am not personally familiar with the benefit-cost ratios on all of them, but from what I understand, have heard our different water officials in Colorado say, we are certainly one of the best that the State has.

Mr. CHENOWETH. I appreciate that statement, Mr. Beise. I know you have been very close to this project since its inception.

There is just one other thing. Is this the first phase of the Gunnison-Arkansas or is this a separate independent project standing alone?

Mr. BEISE. This is not the first phase of the Gunnison-Arkansas.

Mr. ASPINALL. If my colleague will yield. That may be Mr. Beise's opinion, and if the question had been asked that way of these gentlemen, that would be something else. But this happens to be labeled in the hearings as the "initial phase of Gunnison-Arkansas."

Mr. CHENOWETH. I would like to have Mr. Beise or Mr. Christy or any of the witnesses explain that. I think it is a very important point.

Mr. BEISE. Mr. Aspinall, the Bureau of Reclamation initially commenced investigation of a project known as the Gunnison-Arkansas project.

Mr. ASPINALL. It is still in their files.

Mr. BEISE. And the caption is still in their files.

Mr. ASPINALL. The report is still on their desks.

Mr. BEISE. The caption of the report. At their request—we asked that they reprint that caption and reprint all maps because we did not want to advocate the Gunnison-Arkansas project. A plea of economy was made it would cost so many dollars and take so long to reprint those things. If you will refer to the text of my statement, I set forth in minute detail the specific language adopted by the Colorado Water Conservation Board in pointing out 4 years ago that this reference to the Gunnison-Arkansas was a misnomer that might be misinterpreted and cause future difficulties, and that they requested the name of the project be changed, and that it is a separate project, is not the camel's nose under the tent. And there is no commitment of any kind, or do we have any intent, to pervert this project.

It has been stated that under the guise of section 1 of H. R. 412 the language, with such modifications from Senate Document 106 as the Secretary may approve, would authorize a diversion of many hundreds of thousands of acre-feet out of the Gunnison River. We think that accusation answers itself. It is the type of thing that exists in all legislation of this character, and we specifically amended section 8 as it now is in H. R. 412 to preclude anyone from saying that this was the commitment of anybody for any Gunnison-Arkansas project.

By the same token, I do not want to mislead anybody. We do not now say we never will at any time under any circumstances ever want more water. Nor does western Colorado. And it was specifically agreed with them, as I mentioned in my statement, that they do not by implication approve anything. In other words, if, as and when, a generation from now or two, it becomes desirable to investigate the possibility of additional importations, then that whole matter has to be gone into, and the people in western Colorado are the first ones who have to be satisfied that there was such a water, if there was such a need. It is all hypothetical. It could not be done unless that is done.

Mr. ASPINALL. That is all. Thank you.

Mr. SAYLOR. Will the gentleman yield?

Mr. ASPINALL. Mr. Chenoweth has the time.

It is all very well for you to say, but you know you do not speak for the Bureau, and the Bureau still has those plans in their files. Not only that, there was an agreement made at the time this operating agreement was made, as you gentlemen well know, and especially Mr. Christy, there would be no more calls for transmountain diversions until further surveys were made, and then before any possibility of making those surveys representatives of the Colorado Water Conservation Board from the eastern slope unanimously, including Mr. Christy himself, went on record for the participating projects of the city and county of Denver in the upper Colorado River storage and development program. So you must understand the feelings of western Colorado.

Now the question properly put to you is whether or not you gentlemen had any idea in mind, and your answer was "No."

Mr. BEISE. That is right.

Mr. ASPINALL. Your qualification that you would not bind the future is perfectly all right, as far as that is concerned, but you cannot speak for the Bureau of Reclamation.

Mr. BEISE. That is right.

Mr. ASPINALL. And at the present time the Bureau of Reclamation has the Gunnison-Arkansas, as such, still in their files, and on their desks, and they also have the Blue-South Platte on their desks.

You cannot for a moment blame the people of western Colorado for having some fears about these transmountain diversions.

Now I yield back to the gentleman from Colorado.

Mr. CHENOWETH. Is it not true, Mr. Chairman, there is no possibility, even a remote possibility, of the Bureau ever developing such a project without the acquiescence and knowledge and support and assistance of the people on both western and eastern slopes?

Mr. ASPINALL. If the State Legislature of Colorado had changed the method of determining the membership of the Colorado Water Conservation Board, as was proposed in this last legislative assembly, then I might agree with my colleague. But as long as the weight of political power is left to the eastern slope, as it is at the present time and has been since the first board, of which your chairman was a member, was instituted in 1939, you cannot say that because they demonstrated that they do not intend to abide by decisions, and that is what makes the people of western Colorado so fearful of what is going on.

Mr. CHENOWETH. Mr. Chairman, I cannot conceive of such a situation developing to which you refer. It may be in the realm of possi-

bility, but I think it is very remote and almost pure speculation, and I think hardly worthy of consideration by this committee at this time. What I am trying to bring out is that there is no intention at this time to proceed with the Gunnison-Arkansas project by this group or anyone else, to the best of my knowledge.

Mr. ASPINALL. Your question properly directed in that respect is in order. There is no question about it.

Mr. CHENOWETH. I want to emphasize that there is no intention whatever to consider any other project.

Mr. SAYLOR. Will you yield to me?

Mr. CHENOWETH. I think that is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Pennsylvania, Mr. Saylor.

Mr. SAYLOR. Mr. Chairman, Mr. Chenoweth, I would be perfectly willing to go along with your statement as far as these people are concerned, that there may be nothing in their minds with regard to the Gunnison-Arkansas, but they cannot close their eyes to the statement of the present Secretary of the Interior, who less than a year ago said:

> In addition to the Fryingpan-Arkansas project diversions, the ultimate development plans for the Gunnison-Arkansas project will include diversions from Crystal River, Difficult, Castle, and Maroon Creek, all of which are tributaries of Roaring Fork.

These people in this area know that the Bureau of Reclamation made its original plan to take in the Gunnison-Arkansas, and it was not in their wildest dreams, they never thought they could get it through, so they picked out this one section, and they have come down and presented it. And there is a feeling, not just among the opponents of this legislation, but a feeling generally in the United States that this is the camel's nose under the tent, and that this is the first step in the Gunnison-Arkansas.

Mr. RHODES. Will the gentleman yield to me?

Mr. SAYLOR. Yes.

Mr. RHODES. I cannot help but feel, Mr. Chairman, as long as the gentleman from Pennsylvania is a member of this committee, that the people of western Colorado have absolutely nothing to fear about the Gunnison-Arkansas project being constructed, or probably any other reclamation project which the gentleman from Pennsylvania has within his power to stop. The gentleman's writings on the subject of reclamation are well known, and I am afraid widely read. So I think that the chairman might well read those articles and comfort himself with the thought that here on this committee sits the gentleman from Pennsylvania who is against any reclamation anywhere.

Mr. SAYLOR. I want to say that I think my record on reclamation will speak for itself. I am delighted to know that people read what I put out on the subject. Sometimes I have some doubts as to whether or not I am getting across. In view of the reputation which the gentleman from Arizona says I have, I am delighted to know that, even though it has cost me some money to put out some of these articles, and even though some people in Colorado may think I have horns.

I can say to the gentleman from Arizona that I have voted for some projects, and I expect to vote for some more projects.

Mr. CHENOWETH. Including this one, I hope.

Mr. SAYLOR. After I ask some further questions, I will let my views be known on this subject.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. Surely.

Mr. CHENOWETH. I do not share the opinion that the gentleman from Arizona just expressed. I believe that the gentleman from Pennsylvania is for reclamation. I have heard him say so. I heard him say so on the floor of the House. I believe he is genuinely interested in reclamation. That is why I am doing my best to convince him this is a good project.

I just want to say this further to my colleague from Pennsylvania: I have been assiduously and diligently and sincerely trying to do everything within my power to dispel from his mind and the minds of others that this is just the nose of the camel under the tent. I do not know what further I can do.

Mr. SAYLOR. I might say, for the benefit of your constituents here and the representatives of the press, that they can report back home that the most diligent man that I have ever known in the prosecution of any one cause has been Judge Chenoweth in behalf of the Fryingpan-Arkansas project.

Mr. CHENOWETH. I appreciate that.

Mr. SAYLOR. And that many of the places I thought I had bodies interred, he has disinterred them, and I have had to plow over and over again the ground. He has made a conscientious and diligent effort to persuade me. So far he has been unsuccessful.

Mr. CHENOWETH. I am not giving up hope.

Mr. SAYLOR. But I am still not at the stage that I could not change my mind. However, I must say up to this point I have not.

But I want to ask these gentlemen now who appear here and say there is no violation of any principle of reclamation that they have involved in this project—I would like to ask them, since there is no violation of any known principle of reclamation, to point out, if they can for me, any other project where the Federal Government has gone in and attempted to enlarge dams which are not owned by the Bureau of Reclamation.

Mr. BEISE. May I answer that?

Mr. SAYLOR. Yes.

Mr. BEISE. They will be owned by the project and title will be taken in the name of the United States.

Mr. SAYLOR. There is nothing in this bill that puts the title there.

Mr. BEISE. No, you cannot——

Mr. SAYLOR. There is absolutely nothing in this legislation that indicates that.

Mr. BEISE. It would be a matter of negotiation; if that fails, by condemnation. You could not by this bill put title in the United States. That would surpass the power of this committee. It involves the matter of property rights that have to be paid for and negotiated.

Mr. SAYLOR. There is absolutely nothing in this bill, there has never been a witness that came up here from the Department of the Interior up to this point that has told us how they are going to acquire title to the two dams that are now owned by private individuals.

Mr. BEISE. May I tell you how we will?

Mr. SAYLOR. Yes. I want to know how you are going to do that, because the Bureau of Reclamation, who has charge, certainly has not told us.

Mr. BEISE. All right, I will tell you how we are going to do it.

If you will give us authority to proceed with the construction of the Fryingpan-Arkansas project, we will commence negotiations with both the Twin Lakes Reservoir Canal Co. and the Colorado Fuel & Iron Co. We will recognize such rights as they now have. If we cannot agree that they will let us have that site and what is necessary for us to build these enlargements, and confining them to their present rights. we will have to condemn. We have the authority, sir, under Colorado law to condemn. The rights of those people in these reservoirs is not a bit different from any right of any other property owner whose property is required for a canal or for any other portion of these works.

Mr. SAYLOR. That is fine. You are also going to condemn, I suppose, and the State law will allow you to take over the rights of Twin Lakes Reservoir to that fifty-some-odd thousand acre-feet of water?

Mr. BEISE. Oh, no, sir. I did not say that.

Mr. SAYLOR. I asked you.

Mr. BEISE. I say "No."

Mr. SAYLOR. If it is a property right, why can you not condemn that?

Mr. BEISE. Because section 13 of chapter 266 of the law passed in 1937 in the State of Colorado prohibits the condemnation of a water right for transmountain purposes.

Mr. SAYLOR. Then maybe you would be better off to allow the Twin Lakes Development Co. to enlarge their own dam and sell a little more stock and go out and divert that 50,000 acre-feet on their own, which you say they are entitled to.

Mr. CHRISTY. Mr. Saylor, that is not a stock company in the sense of a stock company. It is a mutual ditch company, and the stock represents shares of each farmer under that company.

Mr. SAYLOR. It certainly is a corporation in the sense that the Reconstruction Finance Corporation was authorized to do business with them and make them a loan.

Mr. CHRISTY. They put a plaster on every acre of land under it, too.

Mr. SAYLOR. What is that?

Mr. CHRISTY. I think you will find they put a mortgage on every acre of the ditch system to secure that mortgage, particularly, plus the water rights they aquired from western Colorado.

Mr. SAYLOR. That is interesting because, if this is such a valuable piece of property as the proponents of this piece of legislation would indicate, I would like you to tell the members of this committee and other Members of Congress why, when the Reconstruction Finance Corporation had this asset up for sale, which is so tremendously valuable, they could not even get the face value of the property. There is a nice question that I would like to have answered.

Mr. CHRISTY. They refinanced the loan, did they not?

Mr. SAYLOR. And it was mortgaged for 4 percent and—what is that?

Mr. CHRISTY. Did they not refinance it and pay off that loan?

Mr. SAYLOR. No. The loan was sold by the Reconstruction Finance Corporation.

Mr. CHRISTY. I understand it was refinanced and paid off, sir. I may be in error.

Mr. SAYLOR. The Reconstruction Finance Corporation advertised their mortgage on this project for sale under direction of Congress.

According to you men, it was a mortgage on all of the land in that area, and it was only for $1,348,000, with all of the water rights. And when it was offered at public sale, there was not a bidder that came in and offered Uncle Sam a hundred cents on the dollar.

Now if we are in such a valuable area where farm land goes at $1,200 an acre, I would like somebody to tell us why Uncle Sam, when he only had that $1,300,000 in it, could not get a hundred cents on the dollar.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. CHENOWETH. I am sure you want to keep the record straight. I cannot give you all the details of that transaction, but I think you will find, Mr. Saylor, that the Reconstruction Finance Corporation was very, very happy over that loan, and that the loan would have been paid out in full, 100 cents on the dollar. As you recall, Congress directed RFC to liquidate and compelled the agency to liquidate all of its holdings. There was a question of certain stocks involved. I cannot relate all the details to you. I think you would be satisfied that this was a good transaction on the part of the Government. It was not a question that it was not a good loan or the loan would not be repaid. I think it was exactly the contrary. The RFC was very pleased over the loan.

Mr. SAYLOR. They may have been delighted with the loan, but it was such a good loan that the bankers in Colorado who are now coming before this committee and recommending that $74 million worth of interest-free money be invested in that same area would not come up with $1,300,000 worth of 4 percent money. Now I would like to have somebody from the area tell us why.

In other words, here is the nub of the whole thing: Your committee is now coming down here and advertising far and wide that this is an excellent project, and yet within the past few years the Federal Government could not get 100 cents on the dollar on a mortgage bearing 4 percent interest. I would like to have an answer.

Mr. CHRISTY. I would like to get the details for you and would like to give them to you. I understand an insurance company took that loan. The reason that is probably not a good investment for the local banker, I think, was brought into being by the local banker wherein he said, if there was an adequate supplemental water supply, he would loan anybody around there the money. And in that area, you will recall, the Independence Pass transmountain diversion was built to supply a supplemental water supply to a very highly distressed area, an area which had depreciated in value due to the droughts in the 1930's and they have been battling quite hard to get back on their feet.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. CHENOWETH. I think you will find that mortgage was purchased by a Colorado bonding company, one of our most reputable and most substantial security companies.

Mr. SAYLOR. I have had dealings with Boettcher & Co. I know all about them. Nobody is questioning the reliability of the outfit that bought it. The question I am trying to raise and want answered here by these proponents who are trying to get Uncle Sam to spend

$74 million worth of interest-free money, is why, less than a year ago, Uncle Sam could not get 100 cents on the dollar out of a billion dollar investment bearing 4 percent interest.

Mr. BEISE. Will you grant us permission to investigate the details of the financing and report to you?

Mr. SAYLOR. I mean, if I were prepared to come here and advocate this, as all of you folks are, I certainly would have been prepared to answer that now. It is a known fact that the RFC—I have the story from the RFC itself. They circularized it far and wide, and the best bid they got was from the company in Denver.

Mr. RHODES. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. RHODES. Do you know how much the bonds were sold for?

Mr. SAYLOR. I do not. I know this: They were sold for $1,247,260. Uncle Sam lost a little over a hundred thousand dollars on that deal, plus 35,000 shares of stock.

Mr. CHENOWETH. Will the gentleman yield further?

Mr. SAYLOR. Yes.

Mr. CHENOWETH. I think you will find there was some stock involved over which there were commitments that had been made by the RFC, and it was a question involving control of the company. It was a complicated situation. I regret I cannot give you the details.

Mr. SAYLOR. 35,000 shares of stock, says the circular, went with it.

Mr. CHENOWETH. I think if the gentleman would explore that situation further he would not want to cast any reflections on the transaction this was a good loan and the RFC was very happy with it and it would have been paid out in full.

Mr. SAYLOR. To me, it indicates it was not a good loan, and to any other person who is interested in sound financing it is not a good loan when Uncle Sam puts his assets up for sale and he cannot get 100 cents on the dollar, and the same people from the same area are now asking Uncle Sam to invest $74 million interest-free money.

Mr. CHENOWETH. 67 million. I want to correct the gentleman.

Mr. SAYLOR. 67 million. I would like to have the explanation from the people out there within the next few weeks if they will get it together and furnish it to us. I would like also to know, if they can find out, who bought the 35,000 shares of stock and what they paid for it.

I would also like to find out who bought the mortgage and what they paid for it. It was sold probably by the firm in Denver which made the bid.

Mr. CHENOWETH. You want to know who bought the bonds?

Mr. SAYLOR. I want to know who bought the bonds if we can find that out.

Mr. BEISE. We will get it for you.

Mr. SAYLOR. And also what happened to the 35,000 shares of stock and what was paid for that, who owns it, and who is going to participate in the handout that is going to be made when we try and negotiate for the water rights which are owned by this company.

Mr. CHENOWETH. I think the gentleman will be fully satisfied when he gets all the information.

Mr. CHRISTY. Mr. Saylor, may I make this statement? The projects are not—we have not said we were going to negotiate for any of the water rights of the Twin Lakes Reservoir & Canal Co., sir.

Mr. SAYLOR. Certainly, Mr. Christy, you do not mean to tell me, in negotiating for this dam, that anybody that owns those water rights is not going to be paid for them?

Mr. CHRISTY. I would tell you this, sir: That the agreement that the Twin Lakes people have made with the Water Development Association, and it is the same thing that the Colorado Fuel & Iron Corp. gave to the Water Development Association, as well as a letter to the Bureau, was that they would cooperate with the project sponsors and the conservancy district. In fact, in my testimony I have stated that we would cooperate fully on Sugar Loaf Reservoir as long as the vested water rights we own in the Arkansas Valley are not diminished or impaired.

Now the water rights, we will still own those water rights out of the native waters of the Arkansas River, and so will Colorado Fuel & Iron, and so will the Twin Lakes Reservoir & Canal Co., sir. There has not anyone appeared before your committee that I know of that has intimated that we were taking an acre-foot of water away from vested water-right owners existing now on the Arkansas River and turning it into the project supply that is to be distributed. The nearest we have come to that would be the agreement of the water users to waive their winter diversions, regulate those winter diversions for application to the crops during the growing season, which is a more efficient use of the water. We are not using the water rights of those two. It is the reservoir sites that are there, and under the Colorado law—I am not a lawyer, but I know this: That anyone could come up and enlarge either one of those reservoirs so long as they did not diminish or depreciate the vested right that is there. In other words, somebody could come and enlarge Sugar Loaf Reservoir, which belongs to the Colorado Fuel & Iron, to 50,000 acre-feet capacity if they wished. We would still own the 17,000 acre-feet decree we have under the laws of the State of Colorado in that reservoir. And then we are going to pay for storage at whatever is the going rate, if we use any space. That is the Colorado Fuel & Iron, sir. The same thing is true of Twin Lakes. They will pay a service charge for storing the water that is represented by the vested rights they now own.

Mr. SAYLOR. I might say to you, Mr. Christy, that I would not want to take the responsibility for going up there and trying to build an increased reservoir at either one of those two sites without getting into a lot of trouble. I am satisfied that both Twin Lakes and Colorado Fuel & Iron would have me in court in less time than it took to tell about it.

Now the question I would like to ask is, Who is the authority that is going to appear on behalf of your group with regard to evaporation losses? Or do you not want to consider that feature?

Mr. CHRISTY. I would attempt to answer any questions, if I can, sir.

Mr. SAYLOR. All right. How large is the reservoir to be built at Pueblo?

Mr. CHRISTY. I cannot tell—you are talking about surface area now or capacity?

Mr. SAYLOR. First is capacity, and then surface area.

Mr. CHRISTY. 400,000 acre-feet.

Mr. SAYLOR. How many?

Mr. CHRISTY. 400,000 acre-feet.

Mr. SAYLOR. 400,000 acre-feet. What is the surface area?

Mr. CHRISTY. 4,000 acres or thereabouts, sir.

Mr. SAYLOR. What is the evaporation loss per annum on this hold-over storage reservoir?

Mr. CHRISTY. In that particular area I think it is about 60 inches a year, sir.

Mr. SAYLOR. What does that amount to?

Mr. CHRISTY. 20,000 acre-feet, is it not?

Mr. SAYLOR. And you expect to hold over storage for how many years?

Mr. CHRISTY. That one I could not answer without getting out the table showing the reconstructed flow in the river, sir.

Mr. SAYLOR. Who is going to be charged with the evaporation losses here at this reservoir? Because they now become a very material factor in the amount of water that you are going to have made available.

Mr. CHRISTY. The answer is each—I cannot answer that specifically, sir. That will be one of the things that the conservancy district board of directors, as provided by the statute, will have to set up their rules and regulations on. I would assume that on whatever basis the hold-over water is allocated, that that water would have to carry that charge.

Mr. SAYLOR. That becomes very material, Mr. Christy. And this argument of evaporation losses and the importance of it is not my creature, it is the creature of the Bureau of Reclamation. In other words, where they like to use it to their advantage, they bring it up. Therefore, I think that you folks must realize that on your project, since you are going to lose one-third of the water or better by evaporation in this one reservoir——

Mr. CHRISTY. As it is now, we are losing practically the utility of the entire winter flow.

Mr. SAYLOR. We are now down to the stage where, instead of six inches of water, we are only going to get four inches of water, because substantial earlier water is going to be evaporated that you are going to have by your transmountain diversion. Now you are going to have evaporation on another half a dozen reservoirs up in the mountains.

Mr. CHRISTY. As I recall the studies made over some thirty-odd years of records, sir, it took into consideration the evaporation loss, the fluctuations in the flow of the stream, and when the 6 inches of water or five-tenths of a foot of water available on an average was mentioned, all of those matters were given full consideration in developing this program.

Mr. SAYLOR. Well, sir, if you are relying upon the figures of the Bureau of Reclamation, I can tell you they have not been taken into consideration.

Mr. CHRISTY. When I answered on the evaporation, I did base it on some reservoirs in the Pueblo area, and they are dishpans compared to this one, and it is probably high for the Pueblo Reservoir.

Mr. SAYLOR. If my information is correct, your figures are very conservative.

Mr. CHRISTY. I gave you my figures on the basis of the record I know and have kept for 26 years on our own reservoir. Now the mountain reservoirs, Twin Lakes and Sugar Loaf Reservoir, the evaporation at those two sites, in a court case that was settled some years

back, many of the experts indicated that there was no evaporation off of those reservoirs. In other words, they balanced out. In other words, precipitation on the surface of the reservoir balanced out the loss in those two points.

Now the only time I heard the Bureau of Reclamation on the Fryingpan-Arkansas talk about evaporation loss was in connection with the high mountain reservoirs, and also the one that all of us have considered, and that is of attempting sometime when the project becomes a reality of moving the water from the plains' reservoirs, which are really dishpans out in the flat, into these deep reservoirs where the combined surface area would be much less than it is now, and there is a sizable quantity of water that can be saved from evaporation there again, in an attempt by the water users to utilize all of the water of the Arkansas available to them.

Mr. SAYLOR. If the figures of the Bureau of Reclamation have not taken into consideration your evaporation losses—and, as I said, the only reason I asked you about the Pueblo Reservoir is that I think your position is well founded that in the upper reservoirs and smaller reservoirs higher in the mountains precipitation will offset or very close to offset whatever evaporation losses you have. In other words, the higher you are, the less the evaporation.

Mr. CHRISTY. The flash floods in the Arkansas River that will be stored come out of that plains area, sir, and that is the reason that that particular type has to be used. Otherwise it will go right on down the river to the John Martin Reservoir and spill. So any water we conserve under those circumstances is a gain.

Mr. SAYLOR. Yesterday you heard one of the witnesses testify with regard to the charge to be made as a result of the Mexican Treaty. What would be the position of your group if the entire million and a half acre-feet were chargeable to the upper basin? Then where is the availability of water?

Mr. CHRISTY. Are you assuming that Hoover Dam is empty?

Mr. SAYLOR. I am assuming that annually the requirements are to deliver at the Mexican border a million and a half acre-feet, which is our treaty, and which I maintain is the first charge on the Colorado River water.

Mr. CHRISTY. To be borne by each basin equally.

Mr. SAYLOR. In other words, there is absolutely nothing in the treaty that says how it shall be borne.

Mr. CHRISTY. The Colorado River compact, however, does specify.

Mr. SAYLOR. All the Colorado River compact does is divide the waters at Lee Ferry.

Mr. CHRISTY. As I recall, it does specify that each area, the upper and the lower basin—I am not going to try to expert on legal interpretation—but, as I remember in reading that compact, there is a section that states that the obligation, if and when arrived at, will be borne equally by each basin.

Mr. SAYLOR. Suppose half of it has to be borne by the upper basin, and you come into a low year like you had last year. Where is the water to come from? What will happen to the feasibility of this project?

Mr. CHRISTY. In the operating principles, sir, between eastern and western Colorado the effects of the Colorado River compact and the upper Colorado River compact were taken into consideration, and,

as evidence by the fact that all of the project diversions had to be diverted, at least Aspen Reservoir had first priority. Then we would have to pass to meet the commitments of the law on the river.

I do not want to get into the argument of average or annually, or anything in that line, but my interpretation is this: That within the State's allotment, up until the full development of 7½ million acre-feet of consumptive use in either basin, when that is realized, which can be 50, 75, or 100 years from now—there has been testimony before this committee it might be even longer that that—that up until that happens we are not on this project confronted with the argument or a determination of annual or 10-year average or anything of that nature so long as we stay within Colorado's share, which would mean then, and the project is so designed, that first you have to recognize the terms of the Colorado River Compact; you then have to recognize, under the operating principles, the vested rights in western Colorado and the future rights, except power, before you can make diversions. So there will be 1 year within Colorado where you might divert—wet years, you would divert water and hold it in those high mountain reservoirs, and you would a year that vested interests were calling on the water where diversions would be below the 69,000. But until we are up to the full use in each basin, that question of annual or average is not material as long as we are within the allotment of the State of Colorado. That is my opinion. I am not arguing the annual or the other, sir, at all. I am not trying to interpret the compact. I am trying to point out that interpretation is not of any moment until you get the devolpment to the full measure.

Mr. SAYLOR. That, sir, is a matter of opinion.

Mr. CHRISTY. Yes. And that would answer your question, sir, if there was a call on the river, and if the treaty, in my opinion, called for water, Colorado is in the habit of abiding by compacts that they enter into. We may slip a little once in a while, but when we get the facts we start back and try to rectify.

Mr. SAYLOR. You were here yesterday when the engineer for Colorado Springs was here on the witness stand. You heard him say that they had refused an offer of $350 an acre-foot for water at this Twin Lakes diversion. In fact, I think the figures are correct that it was an offer of 3½ million for the 10,000 acre-feet of water. Is that correct?

Mr. CHRISTY. Yes, sir. That was a capital purchase, however, buying that number of acre-feet annually outright, not an annual charge.

Mr. SAYLOR. That price was at the reservoir, was it not?

Mr. CHRISTY. I would assume, sir, yes. I did not see their proposal. It was in our newspapers. I knew about it.

Mr. SAYLOR. And that, therefore, if Colorado Springs wanted that water for use in Colorado Springs or in the vicinity of Colorado Springs, it was necessary for them to transport that water from the Twin Lakes Reservoir down to Colorado Springs?

Mr. CHRISTY. That is right, sir.

Mr. SAYLOR. That would necessitate new pipelines probably, or at least a tie-in?

Mr. CHRISTY. It certainly would take some kind of a carrying medium to get the water to Colorado Springs.

Mr. SAYLOR. That, of course, would increase the price of the water above the initial capital outlay?

Mr. CHRISTY. That is right.

Mr. SAYLOR. Let me ask you this question: How many projects or transmountain diversions are there that you know of in this area that use open ditches such as proposed in this project?

Mr. CHRISTY. First, let me answer the last part, if I may. With the exception of the collecting ditches as proposed in this project over on the west slopeside of the mountains, into areas where the diversions are limited to 2 months of the year, the collection ditches in the Fryingpan-Arkansas project are concrete-covered or tunnels, and the natural drainage is the medium that collects the water and not an open ditch.

Now answering the first part of your question, sir, this very Buskin-Ivanhoe project that the Highline Canal Co. decrees involve, which were mentioned this morning, those are open ditches. They are small ditches at elevation of 11 and 11.5. Very fast grading. It is a fact that ice and snow accumulate in those ditches.

At one time I designed a transmountain project in that very area, and at that time it was my dream that they would use the natural drainage to collect it, put it in a pipe or a tunnel, because of the climatic conditions at that high altitude. I can state to you, sir, that I have in my files letters from the division engineer of diversion through the Buskin-Ivanhoe tunnel, of water that has been accumulated in Lake Ivanhoe at the west portal, and practically every month of the year, and that water has been stored in our Sugar Loaf Reservoir by agreement since 1926.

Now the Twin Lakes system is also open ditches, the major part of it. There are a couple of short-lined sections and short tunnels. They have a reservoir at the west portal of the tunnel. We get a daily report, what is known as the Arkansas Association. It is an official State report that was made years ago and has been kept up all the time on account of the controversy with the State of Kansas. It shows the flow of the river at the various gaging stations. And on that report I have seen evidence of water coming through the Independence Pass legally stored in Twin Lakes every month of the year. Naturally, during the winter months the flow is small, low.

On this side, the ditches between the powerplants traverse a high meadow or mountain plain. It is not too much rugged construction. It passes through one of the driest areas on the Arkansas River. In fact, right in the area of Buena Vista is one of the low rainfall areas. So you do not have much snow in that area. Your temperatures stay low and remain low.

Beginning at Florence and running 46 miles to Pueblo, we have operating ditches since 1907 throughout the winter. Our new canal, which was constructed in 1943, the best winter operation I had was when the temperature stayed low and I had an ice cover, and I ran through continuously. It is where you get the variation and freezing and thawing and the breaking up of the ice and jams, and the ice moves, that you get into difficulty.

I am of the opinion that those canals taking water clear and free of ice can be operated through the winter in accordance with the schedules that have been worked out to operate them.

In northern Colorado you have open ditches running throughout the winter in the San Luis Valley, where you have cold areas. When there is any water to divert they operate ditches throughout the winter.

Mr. SAYLOR. I am delighted to hear your statement, because you know the Bureau of Reclamation planned those same kinds of open ditches over in that project which they call the Colorado-Big Thompson.

Mr. CHRISTY. I have investigated that, sir, and I feel that there has been some misinformation extended, because it was my understanding from the people in the area and on the ditches that the change in design from open to closed ditches was a question of economy and not because of ice conditions.

Mr. SAYLOR. A question of what, sir?

Mr. CHRISTY. Economy, and not ice conditions, because those ditches originally, it was my understanding—and I want you to understand I have never looked at a detailed plan of the original, I am just basing my statement on people who have lived in that area who were the proponents of the ditch, friends of mine, I have worked with them—that those ditches were hanging around in the shade and then on the precipitous slopes, high cost construction, and complete evaluation indicated that they could put them in pipes and in the tunnels cheaper, and the maintenance and operation and everything else would be much better. Your operation and maintenance on a hillside ditch, I can testify to, because I ran one for 17 miles on the hillside from Florence to Pueblo before we built this new canal, and the first cost is trivial compared to the maintenance afterwards.

Mr. SAYLOR. One of the reasons the Bureau of Reclamation has given for the tremendous increase in costs of the Colorado-Big Thompson is because of the high elevation that was necessary for them to change their design from open ditches to closed ditches.

Mr. CHRISTY. I have never heard the Commissioner or any men I have been in contact with in the Bureau make that statement, sir. That does not mean it has not been made.

Mr. SAYLOR. They are trying to find some reason as to why the costs went up.

Mr. CHRISTY. In my book there is a pretty good reason. You build it over 15 years and have a world war and inflation, and that is a pretty good reason.

Mr. SAYLOR. I was delighted with that pamphlet somebody has down here at the end of the table, put out by the Bureau. After having the cost five times what they originally said it would be, they bragged about the fact that the first year they got it in operation it worked. I think they should brag about it, but they should not have tried to make it such a public demonstration. Their face would have been very red if it would not have worked.

Mr. CHRISTY. I talked to the secretary-manager of that project last fall when the natural resources committee of the United States Chamber of Commerce was in that area. His estimate was that Big Thompson has saved them something around $30 million in 1 year, sir. That does not take into consideration the income taxes and things that came out of that area, but because they were in short water supply and would not have a very good economy in that area in 1954.

Mr. SAYLOR. In other words, actually what the manager and the secretary and everybody else have said is, that after taking 15 years to build it, the first year it was in operation it worked. I do not think there is anything remarkable about that. I think that Uncle Sam

did not get any more than he actually paid for, and the purpose of it was to put water in the area.

Mr. CHRISTY. The only thing those people did not like, it was not finished 10 years before and they had it working all the time.

Mr. SAYLOR. That may be, but the important thing is it was not completed before.

I will reserve my time, Mr. Chairman, until I look at some more of these things.

Mr. METCALF. Would the gentleman yield to me?

Mr. SAYLOR. I am through right now. Go right ahead.

Mr. METCALF. Thank you.

I would like to direct my questions first to the author of the bill. There is not any specific provision in the bill, Judge Chenoweth, that provides protection for the water rights of individuals in Colorado, for the individual water right?

Mr. CHENOWETH. The water rights of individuals, there is nothing here that violates any of the water rights.

Mr. METCALF. There is no specific provision in the bill providing such protection?

Mr. CHENOWITH. I do not recall. Perhaps Mr. Beise, the attorney here of the association, can answer that.

Mr. METCALF. All right.

Mr. BEISE. Yes, sir. Under section 1, the reclamation law of 1902 and acts supplementary thereto.

Mr. METCALF. The next question I was going to ask: You feel in the State of Colorado that the general reclamation law is adequate protection for the water rights of individuals in this area?

Mr. BEISE. If you mean by your question, is there any possibility of the Government condemning or taking water rights of the people, of irrigators there now—is that it? Or are you talking about the question of procedures in adjudication? I mean your question has many aspects.

Mr. METCALF. You do not feel it is necessary to put in any specific provision for the protection of your individual water rights?

Mr. BEISE. No, sir.

Mr. METCALF. I think when Mr. Christy answered a question directed by Mr. Chenoweth, he said he felt there was adequate protection under the reclamation law and under the laws of the State of Colorado for the water rights of the various individuals.

Mr. BEISE. We do believe that, sir.

Mr. CHENOWETH. I would like to state to my distinguished colleague, there is certainly no intention to violate any of those water rights or interfere with them in any way.

Mr. METCALF. I assure you I do not believe there is any such intention and as far as I am concerned, there is also adequate protection under the reclamation laws, but I wanted to be sure that you people had thought about this.

Mr. BEISE. We are satisfied.

Mr. METCALF. And you feel you are adequately protected?

Mr. BEISE. We are indeed.

Mr. METCALF. Thank you very much. That is all, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Sisk.

Mr. SISK. No questions.

Mr. ASPINALL. The Chair recognizes the gentleman from Arizona, Mr. Udall.

Mr. UDALL. I do not know whether Mr. Metcalf covered the point, but in this matter of whether under reclamation law it is your feeling that individual rights are protected against potential Federal condemnation of water rights or future Federal control of water rights, that seems to be an argument that disturbs some of our people. It does not disturb me. I wonder what your view of that is.

Mr. BEISE. I am conscious of that, sir, in that historically, at least in Colorado, rights are claimed for Federal reclamation projects were adjudicated in district court. There is pending in Colorado today adjudication in Federal district court. Particularly with reference to the city of Denver there is a conflict.

I cannot speak for anybody but myself, but a representative of Denver might say to you, "We think some type of legislation is necessary specifying the forum to remove that question of doubt."

Generally speaking, so far as I know and so far as this project is concerned, we are satisfied with existing reclamation law. We feel it is adequate. Insofar as particularly any possibility of condemnation of a western slope water right is concerned, that is expressly prohibited by law. We cannot convey to the eastern slope through any works that a conservancy district is interested in any waters that have been condemned in western Colorado.

Mr. UDALL. Did you hear the testimony this morning of the gentleman who is a rancher?

Mr. BEISE. Mr. Gerbaz?

Mr. UDALL. Yes.

Mr. BEISE. I heard him. I think I heard most of it.

Mr. UDALL. He was somewhat alarmed about his water rights and those of other people in the area.

Mr. BEISE. Yes, sir.

Mr. UDALL. Do you have any comment on that particular contention made by him?

Mr. BEISE. Yes, sir.

Mr. UDALL. I would like to hear you on that.

Mr. BEISE. The engineering subcommittee—maybe you heard Mr. Christy testify a little while ago. I do not know if you were in the room.

Mr. UDALL. No. But be brief about it.

Mr. BEISE. He testified that four separate surveys of water rights were made, water that is available for transporting to the eastern slope through this project, and each and every tabulation considered all water rights utilized in western Colorado to demand their full decreed rights even though they had not used that amount historically. I assure you that from every bit of information I have we will not impair or interfere with any water rights in western Colorado.

Mr. UDALL. If I may just make a comment. It has been my brief experience since coming to Congress—where people come in from a particular area in which a project is proposed, who are opposing it—there is quite a tendency to let their fears run away with them. Certainly we can all imagine situations in any existing or proposed project where there would be unprecedented drought or situations like that would arise and where some persons who have water rights might find themselves getting less water. But if we allowed those fears to

be the dominant thing, we would never get anything done here—if the committee acted on fears. We have to act on the situation as we find it and go ahead and assume that decrees will be respected, and that where unprecedented situations arise in the future there will be adjudications and those things will be worked out.

Mr. BEISE. That is true.

Mr. UDALL. That is certainly my attitude toward such a dispute, and I think the Congress can safely go ahead under such circumstances.

That is all I have, Mr. Chairman.

Mr. ASPINALL. Mr. Beise, section 3 of H. R. 412 refers directly to Senate Document 106 and the operating principles are set forth on page 23 of that document. Do you think that there would be any objection if the committee saw fit to amend that, if they could do so without implying generally that the Federal Government has any jurisdiction over water rights, to spell out specifically the policy which you suggest is in the reclamation law of 1939, and in this particular instance to the effect that this legislation guarantees the integrity of existing decrees and existing water rights in the area from which the water is taken?

Mr. BEISE. I have no objection to that in principle.

Mr. ASPINALL. If it can be done without——

Mr. BEISE. I might add, sir, that section 3 does two things, if you recall. Section 3 says, firstly, that the project will be operated in accordance with the operating principles at such and such a page in Senate Document 106. It also authorizes, as I recall, the Secretary to appoint two representatives.

May I call to your attention, sir, that this is the first project in Colorado where we wanted to create a perpetual standing committee to deal with these problems that may come up years hence that we cannot foresee now. That was the shortcoming in connection with Green Mountain Dam. Senate Document 80, I think it was of the 73d Congress, as I recall, created certain operating principles, but there was no machinery to really carry them into effect. And so these operating principles that are set forth at various places here in the reports on this project, the last paragraph of those, as I recall, permits a reconsideration of some of those principles. In other words, the last sentence of section 17 of the operating principles provides that the power of such commission shall be limited to the collection of data, the making of findings of fact, and the suggestion of changes in operating principles.

Now we would like to keep the operating principles so that, if western Colorado wished to change, and we agreed, and the United States agreed, such could be done, because none of us are so wise that we can foresee every eventuality.

Mr. ASPINALL. Of course, if you read the sentence above, you can see where the fears of western Colorado may be touched off again as far as that is concerned, because the commission is to be composed of one representative from Eastern Colorado Conservancy District, 1 of the Colorado River Conservancy District, 2 of the United States Government, and 1 representative of the State of Colorado appointed by the Colorado Water Conservation Board.

Mr. BEISE. Yes, sir.

Mr. ASPINALL. And with the membership as suggested heretofore at these hearings this afternoon, western Colorado contends even then the power on the board would more than likely be loaded against them. That is one thing that we must be able to put over to the representatives of western Colorado and the people of western Colorado—that we are doing everything we can in order to see that there is equity at this time and in the future in consideration of the differences that might arise.

Mr. BEISE. Yes, sir.

Mr. ASPINALL. Are there any other questions?

Mr. SAYLOR. Now I have had the chance to look over Mr. Ducy's statement. On pages 10 and 11 I find this very interesting comment:

> With all of the care and preparation behind this project it seems too bad that the interests of a few persons, who stand to lose some of their land at the Aspen Reservoir site, have been magnified to a point where there has been deliberate distortion of the facts, and a grotesque effort made to attract attention by paraphrasing Shakespeare when they call it The Rape of the Roaring Fork.

Do you mean to say that the effort of some people in the area to attract nationwide attention by loading down burros with so-called golden frying pans was not an effort to deliberately distort and show the interest of the people in that area?

Mr. DUCY. That is correct, Mr. Saylor: It did demonstrate the interest of the people in our area.

Mr. SAYLOR. And what you are protesting is, that because the number of people who live on the western slope is not nearly as many, as you go on to say, therefore, their rights should be very easily waved aside.

Mr. DUCY. We maintain, sir, we are not depriving them of any rights.

Mr. SAYLOR. Again we come down to the stage that that is a matter of opinion.

Mr. DUCY. Correct, sir.

Mr. SAYLOR. And, after all, one of the things that made this country great, the reason this country came into existence, for the first time in the history of the world, from the time this country was established right down to now, it is the only place where any individual is treated as such and that numbers, merely because they are on your side, do not make things right. Therefore it seems to me that it comes with rather poor grace from the proponents of the legislation to attempt to hold up to ridicule the opponents who happen to live on the other side of the ridge.

I feel very strongly about this matter and so do they. While they are not here vocally, since apparently they have not been able to raise as much money as you people, out there in the area there are people that do not agree with you, and they are still entitled to be heard. The mere fact they are few does not make your claim right just because you have many.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. CHENOWETH. I think the gentleman heard four witnesses from that area this morning. I did my best, and I think other members did their best, to elicit any information as to how in any manner their rights were being violated, and I failed to get any such information from them.

Mr. SAYLOR. I did not.

Mr. CHENOWETH. They had a good many fears and sort of nebulous doubts, and were afraid something might happen in the future. When I called their attention to the operating principles, where every effort was made to fully protect the rights of those people—a man owning just a few second-feet of water over there is going to be protected just the same as anyone else. I want to say I think every effort has been made to do that. I do not think the gentleman means to insinuate now, because there are larger numbers on the eastern slope, we are trying to take unfair advantage of the western slope. I am sure there is no such intention.

Mr. SAYLOR. I do not say you are taking unfair advantage, but it certainly seems to me to come with poor grace to attempt to ridicule those on the other side. In other words, if you have got a good product, your job is to sell that, not to ridicule the opposition.

Mr. CHENOWETH. That is what we are proposing to do, I want to say to the gentleman.

Mr. SAYLOR. I do not think so.

Mr. CHENOWETH. We are attempting to sell it to him. That is what I am working on.

Mr. SAYLOR. Now I have some more questions to ask.

Two years ago you were before this committee and had a bill that called for $172 million. Now you have a bill calling for $156 million. What is the difference in the two bills? That is addressed to any one of the four of you.

Mr. CHRISTY. That was described to you, I thought, in pretty much detail by the Department the other day, sir.

You have a slight reduction in the cost indexes. You also have some slight modifications in the municipal features, and the elimination of filtration and a pumping plant at Pueblo Reservoir which were incorporated in that original estimate of $172,898,000, whatever it was, last year, sir.

Mr. SAYLOR. The purification plant is eliminated?

Mr. CHRISTY. Yes, sir, and a pumping plant.

Mr. SAYLOR. And a pumping plant.

Mr. CHRISTY. And some transmission and substations because there has been recently a new tie line built between Colorado Springs and Pueblo. That is my understanding that is the difference.

Mr. SAYLOR. There is a 10 percent reduction in overall costs of this project. I would like to ask you, as a representative here either of the Colorado Fuel & Iron Co. or in any other capacity, has your experience been that your company has been able to build anything cheaper in the last 2 years?

Mr. CHRISTY. All the bids recently in our area on highways and sizable contracts have been running slightly under the engineers' estimate and have been lower than they were 2 years ago. There are other items. It depends upon what type of work you are talking about. I think you will find that certain items of specific machinery and things like that are up, sir. But the cost of moving a yard of dirt and things of that kind are down. I would not want to try to expert on the complete reduction from the 172 to the 156 because, sir, I have not looked at every single unit.

Mr. SAYLOR. It seems strange to me, if you reduce the cost 10 percent, that the benefit ratio remains the same. Do you have any explanation for that?

Mr. CHRISTY. That is a fair question, sir, but I am of the opinion personally that the cost-benefit ratio is a formula that has been arrived at down here to evaluate projects, and I think that the Bureau and the various agencies that use that one are better able or more competent to analyze that cost-benefit ratio.

Mr. SAYLOR. Does not it seem a little strange to you, as it did to me, if you reduce 10 percent in all over-all costs, the cost-benefit ratio does not go up somewhat along the line?

Mr. CHRISTY. As I recall, one of the reasons is there is a reduction—I see an item in lieu of taxes in the cost this time that I did not see before, where I made a hasty glance. I think you will find there are some items of that nature that probably account for the fact that the cost-benefit is the same.

Mr. SAYLOR. It is still a cost item. I mean they just allocated the costs to a couple of different things.

Mr. CHRISTY. The changes in the allocation of costs, sir—in my work on the International Reclamation Association Board, I know that the representatives of the 17 Western States have been insisting and endeavoring to get all of the Federal agencies to use a 1-type formula to evaluate projects. I am advised—I have had a copy of the formula—I am not an expert on it, but I do understand that the Federal Power Commission and the Army and the Bureau of Reclamation, at least the heads of those Departments, did arrive at an agreement on the allocations of costs. It is my understanding that the allocation of costs in this project are in line with that new formula that was agreed to between those various Department heads. I think there should be a common denominator.

Mr. SAYLOR. With that I hearily agree. I have been trying for some years to get the various agencies to arrive at one formula.

Mr. CHRISTY. We are all on your team.

Mr. SAYLOR. In that respect at least we are pulling together?

Mr. CHRISTY. Yes, sir.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. CHENOWETH. I thought the gentleman would be very happy over the reduction in cost, and that it might be the factor that would sway him to support this project.

Mr. SAYLOR. I might say to the gentleman, if I had any faith in the Bureau of Reclamation, I would be most happy to have that reduction. But I am afraid that is a little taffy that has been given to us, so when the final bill is paid it will not be $156 million, it will not be $172 million, it will be nearer $200 million.

Mr. CHENOWETH. I think the Bureau has been fairly accurate in recent compilations. I do not know of any great disparity in their figures in recent years. Maybe there were some discrepancies, perhaps some miscalculations, but I think we ought to give credit to the Bureau for having done a good job on this project and other projects on which recent hearings have been held. Their figures have been checked and verified by independent engineers and I think they have held up pretty well.

Mr. SAYLOR. As I say, I think I pointed out the finest example I know, which happens to be Eklutna, which as you know is strictly a power project, and it ends up costing millions upon millions more, even after the committee tried very carefully to get the Bureau to pinpoint it so that we would not run into this same situation. I am very much interested, because I will offer an amendment when we get down to the bill that we shall fix the maximum right in accordance with what the Bureau has stated. Again I do not know that it will do too much good, because the folks will come up and say: "So we have spent $156 million and we do not have it completed, and it will only cost 50 or 60 million more to complete. Are we going to leave that go down the drain?"

Mr. CHENOWETH. I want to state to the gentleman I think our bill last year did contain such a limitation.

Mr. SAYLOR. I do not know, but I am sure when it gets out of the committee this year, it will, if it gets out.

Mr. CHENOWETH. And I hope the limitation will be more persuasive than I.

Mr. ASPINALL. The Chair suggests the gentleman is through with his questions.

Mr. SAYLOR. Off the record.

(Discussion off the record.)

Mr. ASPINALL. Thank you very much, gentlemen, for appearing. The remaining witnesses in opposition from southern California will necessarily be heard at a later date.

Mr. CHENOWETH. Mr. Chairman, I would like to ask unanimous consent that these witnesses may be permitted to file supplemental statements on some of these matters we have discussed today.

Mr. ASPINALL. It would be a single supplemental statement from all of them, not one from each one of them?

Mr. CHENOWETH. You would like to confine it to one statement?

Mr. ASPINALL. Yes.

Mr. CHENOWETH. Is there a time limit?

Mr. ASPINALL. The time limit will be within 10 days——

Mr. CHENOWETH. It was 3 weeks this morning.

Mr. ASPINALL. Ten days after the close of the hearings. The hearings will not be closed until we hear from the remaining opposition witnesses and also from the Bureau.

Without objection, the unanimous consent request of our colleague from Colorado is granted.

The next meeting on this particular matter will be subject to the call of the chairman. The committee stands adjourned.

(Whereupon, at 3:35 p. m., the subcommittee adjourned to reconvene at the call of the Chair.)

FRYINGPAN-ARKANSAS PROJECT, COLORADO

TUESDAY, MAY 17, 1955

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D. C.

The subcommittee met, pursuant to recess, at 10:08 a. m., in the committee room, New House Officer Building, Hon. Wayne N. Aspinall (chairman) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will now be in session for the further consideration of H. R. 412 by our colleague Mr. Chenoweth to authorize the construction, operation and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas project, Colorado.

This morning has been set aside to hear opposition witnesses who appear in the interest of southern California. I am hopeful that we might finish this morning. If we do not, we shall try to get permission to sit during general debate this afternoon. If that will be all right with the chairman.

Mr. ENGLE. That will be agreeable.

Mr. ASPINALL. At this time the Chair calls to the witness stand the representatives of southern California, Mr. Northcutt Ely and Mr. Raymond Matthew. We are glad to have you before our committee this morning, and we shall be glad to receive your testimony. Which one will speak first?

Mr. ELY. Mr. Matthew.

Mr. ASPINALL. Mr. Matthew will speak first. You may proceed.

STATEMENT OF RAYMOND MATTHEW, CHIEF ENGINEER, COLORADO RIVER BOARD OF CALIFORNIA

Mr. MATTHEW. Mr. Chairman, my name is Raymond Matthew. I am chief engineer of the Colorado River Board of California. I appear here on behalf of the Colorado River Board of California, which is a State agency charged with the duty and responsibility of protecting the interests of California in the waters of the Colorado River.

California agencies have rights established by prior appropriation and by contract with the Secretary of the Interior under the authority of the Boulder Canyon Project Act, providing for the use in California of 5,362,000 acre-feet annually of water from the Colorado River system. It is the duty of the State to protect and preserve those rights of its citizens.

Position of the Colorado River Board of California:

The position of the Colorado River Board of California with respect to the proposed Fryingpan-Arkansas project is based upon several important considerations, viz:

1. The Fryingpan-Arkansas project is the forerunner of the Gunnison-Arkansas project that contemplates the diversion of about 900,000 acre-feet per annum of Colorado River water or 10 times the amount proposed for initial diversion. It is another transmountain diversion project among numerous others existing and proposed. Existing projects now divert about 500,000 acre-feet a year. Additional projects currently proposed (central Utah, Gooseberry, and San Juan-Chama) would divert initially over 400,000 acre-feet more. The Blue River-South Platte project to divert 200,000 to 500,000 acre-feet of water a year is also being actively proposed. The Bureau of Reclamation has inventoried (H. Doc. 419, 80th Cong.) potential transmountain diversion projects which could involve another million acre-feet annually, or some 3 million acre-feet total.

In view of the obvious adverse effect of such transmountain diversions on the quality of water available to the lower basin, it is the board's position that no additional transmountain diversion projects should be authorized in the upper basin until an authoritative determination is made regarding the entire matter of quality of water, particularly with respect to the effect of such upstream developments on the water supply available for use in the lower basin, and until the legal issues in regard thereto are resolved.

Mr. Chairman, apparently California is not alone in being concerned in regard to quality of water resulting from developments in the upper basin, and particularly transmountain diversions. In the report of the Bureau of Reclamation on the Cliffs Divide project, Colorado, the Status Report, dated February 1954, there appears on page 20 the following statement:

> With extensive additional irrigation in the Cliffs Divide project area, and with an extensive increase in transmountain diversions, the remaining flows in the Colorado River would have a greater concentration of dissolved solids than at present. In some seasons the increased concentration may become detrimental to irrigation in Grand Valley.

2. The Fryingpan-Arkansas project, although proposed to be authorized in a separate bill, is actually part and parcel of the whole upper Colorado River Basin development, including the main stream reservoirs and powerplants and an indefinite number of participating reclamation projects. All must be considered together in their effect on the water supply of the lower basin and California in particular, in accordance with the proposed overall plan of development and operation.

3. The plans for construction and operation of the Fryingpan-Arkansas project involve all of the same questions of interpretation of the compact and related laws and documents that are inherent in the proposed upper basin storage plan. There are also involved the same proposals for financing the project as in the case of the upper basin storage project, which depart materially from existing reclamation law of general application and are unsound from the standpoint of national public interest. Furthermore there are unresolved questions of engineering feasibility with respect to certain units of the project which would materially affect its economic justification and financial feasibility.

In view of all of these considerations, the Colorado River Board of California opposes the authorization of the Fryingpan-Arkansas project as proposed in the pending bill. Annexed hereto is a resolution of the Colorado River Board, unanimously adopted at a regular meeting of the board on June 2, 1954. The position of the board remains the same as when the resolution was adopted.

WATER SUPPLY AND USE

According to the Bureau's report, the proposed Fryingpan-Arkansas project would provide an average annual net salable water supply at Pueblo Reservoir of 158,200 acre-feet. This supply would be made available by conservation and reregulation of the waters of the Arkansas River supplemented by the proposed diversion of Colorado River system water. Of the total supply, the Bureau estimates that 92,000 acre-feet or about 60 percent would be made available from the Arkansas River.

It is understood that it is now proposed to use 20,500 acre-feet annually of the total water supply for municipal and industrial use, leaving a balance of 137,700 acre-feet annually for irrigation. This would be used to furnish a supplemental supply for 309,000 acres of presently irrigated lands in the Arkansas River Valley. The supply would provide less than 0.5 acre-feet per acre on the lands to be served.

ECONOMIC AND FINANCIAL ASPECTS

The economic justification and financial feasibility of the proposed Fryingpan-Arkansas project appear highly questionable, not only as respects the overall development but also as to individual units, features, and functions. The estimates of cost and revenues and plans of repayment have been modified several times, indicating uncertainty with respect thereto. In the most recent changes, estimated costs have been revised downward and estimated revenues increased. It appears that the revenue estimates are overoptimistic and doubtful of realization; and that the cost of the project is greatly underestimated.

TRANSMOUNTAIN DIVERSION FEATURES

The basic transmountain diversion features of the proposed project would comprise a system of collecting conduits on the west slope, a replacement reservoir near Aspen, a diversion tunnel through the divide, and the Sugar Loaf and Twin Lakes, regulating storage reservoirs on the east slope. The construction cost of these works, as estimated by the Bureau, would aggregate about $55 million. The proposed works would provide a water supply from the Colorado River Basin of 66,200 acre-feet a year average at Pubelo for irrigation and municipal use. The cost to the Federal Government of developing and supplying this water would be about $40 per acre-foot. This is about 7 times the estimated revenue per acre-foot that would be received from this water for irrigation, and over 3 times the estimated revenue that would be received therefrom for municipal uses, including estimated conservancy district taxes.

The huge cost of the transmountain diversion features of the proposed project, in the light of the small amount of water that would

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be furnished thereby (only about 2 inches of irrigation water supply), points to the conclusion that the transmountain diversion portion of the project is unwarranted and without economic justification.

POWER FEATURES

The power features of the project as proposed include a series of powerplants along the Arkansas River with a combined installed capacity of 104,800 kilowatts. Six of these plants would be located along a 20-mile stretch of the Arkansas River between the vicinity of Leadville and Salida, involving 60 miles of open canals in utilizing a total drop of about 2,250 feet in elevation. The seventh plant would be located at Pueblo Dam. The Bureau estimates the total firm power output of these plants at 370 million kilowatt-hours annually and secondary power at 97.2 million kilowatt-hours annually, both at load centers. Power revenues are based upon selling firm power at 6 mills and secondary power at 3.5 mills per kilowatt-hour.

Detailed analyses of the individual plants indicate that the cost of firm power from 4 of the 7 plants would materially exceed the indicated selling price of 6 mills per kilowatt-hour, although the average for all plants is about 6 mills. From the standpoint of the financial feasibility of the power features of the project, it apparently would be financially advantageous to eliminate some or all of the high cost powerplants from the plan, and thereby materially reduce the investment. However, the feasibility of the proposed power development is questionable in other particulars.

A study of the Bureau's allocations of cost shows that the indicated unit costs of power per kilowatt-hour from the combined system depend upon the fact that none of the construction cost of west slope water collection and storage facilities nor of the storage reservoirs except part of Twin Lakes Reservoir has been allocated to power. It is not apparent why a material part of the cost of such works which furnish or control water for power production has not been charged to power. If that were done, obviously the cost of power would be increased.

The estimates of firm power output and power revenues are unsupported and appear exaggerated. Detailed operation studies furnished by the Bureau indicate a lesser output in certain years than the amount of firm energy on which estimates of revenue are based. Moreover, there is no assurance that the hydro power produced could and would be sold at 6 mills per kilowatt-hour particularly over a long period of 60 years or more. Other competing sources of power are and will be available in the market area. The bill contains no provision requiring a power contract in advance of construction to assure repayment of the costs; nor does it appear to specify any repayment period for power.

Finally, there is grave doubt as to the engineering feasibility of the Arkansas power canal. The project plans propose to construct and operate this unit as an open canal (actually a series of open canals aggregating 60 miles in length) to convey water to a series of six power plants between the vicinity of Leadville and Salida, located along the canyon of the Arkansas River, at elevations of over 7,000 to nearly 10,000 feet above sea level, in a rugged mountain region where for several months of the winter severe ice and snow conditions

prevail. The practicability of operating an open canal under such conditions is highly questionable. Under similar conditions, on the Colorado-Big Thompson project in Colorado, a few miles to the north, the Bureau of Reclamation found it necessary to substitute tunnels and covered conduits for the open canals originally proposed. This change in plans has been stated to be one of the major reasons why the construction cost of that project to date has nearly quadrupled over the estimate offered to Congress.

The Secretary of the Interior has reported that if covered conduits are found to be required, the total construction cost of the Fryingpan project would be increased about $64 million, and that such increase would render the project infeasible. An additional cost of $64 million for the power development would raise the total project cost to $220 million or more—an increase of about 40 percent over the Bureau's estimate.

In view of the foregoing, the economic justification and financial feasibility of the power development as proposed for the project is highly questionable, which casts doubt on the feasibility of the entire project.

IRRIGATION FEATURES

According to the most recent estimates of the Bureau, the construction cost allocated to irrigation would be $67,653,000 or $219 per acre on the entire area of 309,000 acres of irrigated land that would be furnished a supplemental water supply averaging less than 0.5 acre-foot per acre from the proposed project. Calculated on a full water supply basis, the construction cost per acre equivalent would be $1,166, which represents the true measure of the irrigation construction cost.

It is proposed by the Bureau to charge the irrigators a base rate of $5.40 per acre-foot for project water at or near Pueblo. Other revenues would be secured from storage of Twin Lakes water and regulation of winter water. In addition, it is proposed that substantial payments would be secured from tax levies in a conservancy district which is to be organized, embracing both the agricultural and urban areas to be served by the project.

According to Bureau estimates, 70 percent of the irrigation investment would be repaid from irrigation water revenues and conservancy district taxes, 36 percent direct payment by the irrigation water users and 34 percent by taxes. It is proposed to repay the remaining 30 percent of the irrigation investment from power revenues, starting some 40 to 50 years in the future, after the power investment has been repaid with interest.

The estimated irrigation revenues and repayments appear questionable in two respects. First, it is doubtful if the irrigators would be able and willing to pay as much as $5.40 per acre-foot for project water, over an extended period of 50 years or more. Secondly, doubt has been expressed as to whether the proposed charge for regulation of winter water would actually be realized. The Department of Agriculture in its comments on the Bureau reports raised questions as to those charges and revenues. Moreover, it does not appear that the repayments from conservancy district taxes would be fully assured. The bill contains no provisions requiring the execution of a repayment contract prior to construction.

Under the repayment plan proposed by the Bureau, the starting of repayment of 30 percent of the irrigation investment from power revenues would be postponed for 40 to 50 years, as indicated by detailed repayment analyses. Such a postponement would obviously greatly increase the subsidy from the Federal Treasury in interest costs on the funds advanced, that would have to be paid out of Federal taxes. The accumulated interest charges on the funds borrowed by the Federal Government to defray the costs of the project allocated to irrigation could and would never be repaid from project revenues and would have to be paid out of general taxes even though the capital investments were eventually repaid. The resulting national debt would keep on increasing indefinitely unless or until paid off by general taxes.

Preliminary analyses indicate that the increase in the national debt resulting from the Federal subsidy in accumulated interest charges on the irrigation investment of the proposed project would be more than 3 times the original construction cost at the end of the repayment period of about 60 years. Thus the Federal subsidy in interest cost occasioned by the irrigation investment under the repayment program would be about $700 per acre on the entire area of 309,000 acres to be served, and about $3,700 per acre on an equivalent full water supply basis.

Considering that the actual cost of the proposed project might be over $200 million as previously indicated, the repayment period would have to be materially extended, with the result that the Federal subsidy would be double or more the amount involved under the costs and plan of financing presented by the Bureau.

In view of the high cost of the irrigation features of the Fryingpan-Arkansas project as proposed—$219 per acre construction cost to provide a supplemental supply of 0.5 acre-foot per acre for the 309,000 acres to be served which is equivalent to $1,166 per acre for a full water supply, and in addition a required Federal subsidy of more than 3 times the construction cost—the justification for the project as a Federal reclamation undertaking appears questionable.

Bureau spokesmen and proponents of the Fryingpan-Arkansas project place great weight upon the benefit-cost ratio as a criterion for determination of economic justification of the project. As is well known, such a criterion is not sanctioned by existing reclamation law which requires a showing of financial reimbursability as the only basis for economic justification of reclamation projects.

Moreover, the methods used by the Bureau in the analysis of benefits and costs are unrealistic in several respects. Large indirect benefits are included which involve a very considerable element of judgment in evaluation. Furthermore, the analysis of benefits is made on the basis of 100 years which is highly speculative. Other agencies of the Government use 50 years as the maximum time for which benefit-cost figures should be estimated.

No account is taken in the benefit-cost analysis of the offsetting detriments that would result from the diversion of Colorado River system water for irrigation in the Arkansas River Valley. The diversion of such water would result in large losses in actual and potential power production and revenues in the Colorado River Basin, which should be evaluated and taken into account in any appraisal of national benefits and costs.

Indirect benefits on the irrigation features of the Fryingpan-Arkansas project are estimated by the Bureau at 1.7 times the direct benefits, which appears to be unrealistic. The total annual irrigation benefits are estimated at $13.80 per acre as compared to a total annual estimated payment by the irrigators and from district tax of $3 per acre. Thus, total benefits are estimated at 4.6 times the total of the annual payment ability of the irrigation district. Direct annual irrigation benefits are estimated at $5 per acre, as compared to an annual repayment by the irrigators alone of $1.85 per acre including operation and maintenance charges. Thus, even the direct annual irrigation benefits are estimated at 2.7 times the direct repayment ability of the irrigators. These figures illustrate the unrealistic nature of the Bureau's estimates with respect to benefits.

Analyses indicate that if the benefits were estimated upon a more realistic period of 50 years instead of 100 years as used by the Bureau, the benefit-cost ratio on the irrigation features of the project, based upon direct benefits only, would be 0.54 to 1. It would appear that the benefit-cost analysis on the proposed project, particularly with respect to irrigation, should be reviewed by a competent independent authority such as the United States Department of Agriculture.

ARKANSAS RIVER DEVELOPMENT

Excluding the transmountain diversion and power development features of the proposed project, the remaining portion would constitute the Arkansas River development as designated herein. As previously set forth, about 60 percent of the water supply that would be provided by the project, according to Bureau estimates, would be made available from the Arkansas River. This would be accomplished by the conservation and re-regulation of the waters of the Arkansas River through the construction and operation of the Pueblo Reservoir with a storage capacity of 400,000 acre-feet.

The cost of Pueblo Reservoir is estimated by the Bureau at $41,418,000, excluding the powerplant. Of this total, $17,911,000 is allocated to flood control as nonreimbursable, leaving a balance of reimbursable costs of $23,507,000. Of the reimbursable costs the Bureau allocates $8,200,000 to municipal water supply. The balance of $15,307,000 would be allocated to irrigation, amounting to $50 per acre on the irrigated area of 309,000 acres.

According to Bureau estimates, the net salable water that would be made available from the Arkansas River by conservation and re-regulation by the Pueblo Reservoir would amount to 92,000 acre-feet per year. This supply would be capable of providing 20,500 acre-feet for municipal use as proposed to be furnished by the project and 71,500 acre-feet for irrigation, annually.

Preliminary analyses indicate that the reimbursable cost chargeable to irrigation could be repaid in a period of 50 years with irrigation water revenues based upon a rate of $2.25 per acre-foot together with conservancy district taxes of only about one-third of the amount that the Bureau estimates would be paid under the proposed project. In addition, the reimbursable cost chargeable to municipal use of $8,200,000 could be amortized with interest by the charges for municipal water as estimated by the Bureau and over the same period of time.

If municipal water delivery systems were built by the Federal Gov-

ernment an additional construction cost as estimated by the Bureau of $16,328,000 would be added, bringing the total cost of the Arkansas River development to $57,746,000. However, all of this delivery-system cost would be repaid by the cities with interest in accordance with the proposed plan of the Bureau.

These preliminary analyses indicate that the Arkansas River development could be carried out by itself, independent of the proposed transmountain diversion features of the Fryingpan-Arkansas project, as a financially feasible undertaking under existing reclamation law. A capital cost of $58 million would cover the entire cost of such a development including the cost of municipal water supply delivery systems.

The reimbursable cost of the water supply itself aggregating 92,000 acre-feet a year would only be $23,507,000. This may be compared with the estimated cost of $55 million to secure 66,000 acre-feet a year by transmountain diversion. The disparity between these comparisons further points out the excessively high cost of the proposed transmountain development.

The Arkansas River development by itself woud have substantial benefits. A large benefit would be realized from the flood control provided by the Pueblo Reservoir. In addition, the project could provide municipal water in the same amount as estimated for the proposed project, namely, 20,500 acre-feet, also 71,500 acre-feet for supplemental irrigation which would materially relieve present shortages in supply.

It would appear, therefore, consideration should be given to the authorization of the Arkansas River development at an estimated capital cost of about $58 million; and to deferring the remainder of the project as proposed including the transmountain diversion features and the power system, involving a cost of about $100 million, for further consideration of questions of feasibility and economic justification.

CONCLUSION

Considering the many uncertainties with respect to the Fryingpan-Arkansas project as planned, including serious questions as to engineering feasibility of certain units and as to economic justification and financial soundness of the project as a whole and its separate features, a disinterested board of qualified engineers should be appointed to review the engineering features and the economic and financial aspects of the proposed plan and make a report to the Congress before action is taken on this proposed legislation.

Furthermore, the proposed financial plan and repayment program for the Fryingpan-Arkansas project constitutes a material departure from existing reclamation law. Involved in the proposed plan are fundamental questions of national policy with respect to reclamation development which are presently under study and soon to be reported upon by the Hoover Commission and the President's Cabinet Committee. It would seem, therefore, that Congress should await the reports of these agencies and then determine a general policy before acting upon his bill which, if adopted, would set up new policy by special legislation.

Pending such reports regarding feasibility and policy affecting the overall Fryingpan-Arkansas project as planned and proposed, the

Arkansas River development of the proposed project with an estimated cost of $58 million appears to offer a financially feasible undertaking under reclamation law that would provide substantial benefits in controlling floods and furnishing additional municipal and irrigation water supplies, and to justify authorization at this time.

As before stated, Mr. Chairman, there is appended the resolution of the Board, which, if it meets with your approval, I would like to have printed along with my statement.

Mr. ASPINALL. Unless there is an objection, the resolution referred to will be made a part of the record.

Hearing no objection, it is so ordered.

(The resolution referred to follows:)

RESOLUTION OF COLORADO RIVER BOARD OF CALIFORNIA OPPOSING PENDING LEGISLATION AUTHORIZING FRYINGPAN-ARKANSAS PROJECT IN COLORADO

The Colorado River Board of California recommends that consideration of S. 964, H. R. 236, 83d Congress, bills to authorize the construction of the Fryingpan-Arkansas project in Colorado, be deferred and that said bills be not enacted at this time pending determination by the Congress of a comprehensive plan for the development of the upper Colorado River Basin. The project is subject to the same criticism as the Colorado River storage project and participating projects opposed by this board.

Both proposals involve the use of waters of the Colorado River system. The Fryingpan-Arkansas project itself will not use large quantities, but is the initial stage of the huge Gunnison transmountain diversion project, which would take about nine hundred thousand acre-feet per year out of the Colorado River Basin. This board believes that before any additional transmountain diversion projects are authorized the Reclamation Bureau should report on the effect of these and other projects on the quality of water remaining for use within the lower basin.

Moreover, the project is based upon the same interpretations of the Colorado River compact to which California objects in the case of the Colorado River storage project, and which are now at issue in the United States Supreme Court.

The Fryingpan-Arkansas project involves the same economic issues as are commented upon in the resolution of the Colorado River Board opposing authorization of the Colorado River storage project. This board believes that before changes in the reclamation law's standards of feasibility are made, of the sweeping magnitude proposed by these measures, the recommendations of the Hoover Commission should be awaited.

For these reasons, the Colorado River Board of California recommends to the Senators and Representatives of this State in the Congress of the United States that S. 964 and H. R. 236, 83d Congress, and any similar legislation authorizing construction of the Fryingpan-Arkansas project for the use of waters of the Colorado River system, be not enacted at this time.

STATE OF CALIFORNIA,
County of Los Angeles, ss:

I, Harold F. Pellegrin, executive secretary of the Colorado River Board, do hereby certify that the foregoing is a true copy of a resolution unanimously adopted by said board at a regular meeting thereof, duly convented and held at its office in Los Angeles on the 2d day of June 1954, at which a quorum of said board was present and acting throughout.

Dated this 2d day of June 1954.

HAROLD F. PELLEGRIN,
Executive Secretary.

Mr. ASPINALL. Mr. Ely, we shall be glad to listen to your statement.

STATEMENT OF NORTHCUTT ELY, SPECIAL COUNSEL, COLORADO RIVER BOARD OF CALIFORNIA, WASHINGTON, D. C.

Mr. ELY. Thank you, Mr. Chairman.

My name is Northcutt Ely. I am an attorney, with offices in the Tower Building, Washington 5, D. C. I appear here as special counsel to the Colorado River Board of California, an agency of the State government created by act of the California Legislature in 1937.

Recently I appeared before you on behalf of the board in connection with bills to authorize the Colorado River storage project. I will refer later to some of the objections we made to that project which are applicable to H. R. 412, the Fryingpan-Arkansas project bill now before you, and their relation to the pending Supreme Court case of *Arizona* v. *California et al.*, in which I represent California as assistant attorney general, under the direction of Attorney General Edmund G. Brown.

CALIFORNIA'S RIGHTS ON THE COLORADO RIVER

Our obligation is to protect California's rights to the waters of the Colorado River system. These aggregate 5,362,000 acre-feet per annum, covered by contracts of the United States made under section 5 of the Boulder Canyon Project Act for the storage and delivery of water from Hoover Dam. To put this quantity in perspective, it compares with 3,885,000 acre-feet apportioned to the State of Colorado by the upper Colorado River Basin compact. California's allocation is 30 percent larger than Colorado's, for use by a population several times as great. Unfortunately, however, about 1 million acre-feet of the 5,362,000 acre-feet of California's water is in the category of excess or surplus waters unapportioned by the compact, and only 4,400,000 is within the category of waters apportioned in perpetuity by article III (a) of the compact. These figures result from provisions of section 4 (a) of the Boulder Canyon Project Act which required the Legislature of California to accept limitations on California's uses, at the demand of the upper basin States, in consequence of Arizona's refusal to ratify the Colorado River compact.

These rights are held by 3 California projects which have been constructed at a cost in excess of $500 million. Those projects, north to south, are the Colorado River aqueduct, which takes water at Parker Dam to supply the coastal plain; the Palo Verde works, where diversions have been made since 1877; and the All-American Canal, which takes water to the Imperial and Coachella Valleys. Only water enough for these three diversions was provided by the Colorado River compact and the Boulder Canyon Project Act—all other project proposals had to be abandoned.

THE FRYINGPAN-ARKANSAS PROJECT

The project now before you, to be located in the Arkansas Valley in Colorado, will derive its water supply from 2 sources: about 70 percent from the Arkansas River and about 30 percent by transmountain diversions from the Colorado River watershed. The total quantity of water involved averages about 170,000 acre-feet per annum. This will not solve the service area's water shortage, but will only reduce the average deficiency to about 19 percent. The importations from the

Colorado River will amount to only about 70,000 acre-feet per year on the average. As 350,000 acres are to be served, the Colorado River will furnish less than 3 inches per acre, or a fifth of an acre-foot, per year. The bill incorporates by reference a report by the Interior Department (S. Doc. 106, 82d Cong.). Senate Document 106, an Interior Department report, identified the Fryingpan-Arkansas project as the first unit of the ultimate Gunnison-Arkansas project, which would carry 900,000 acre-feet per year out of the Colorado River Basin into the Arkansas Basin. There is a newer report, House Document 187, 83d Congress, which was incorporated by reference in the bill reported by this committee in the last Congress (H. R. 236, 83d Cong.). It is not clear why H. R. 412 reverts to the older and superseded report unless it is intended to revive the interest component financing and other features of Senate Document 106 which the Budget Bureau and other agencies of the Government condemned in their comments which appear in House Document 187, 83d Congress, but which do not appear in the older report, Senate Document 106, 82d Congress, submitted in a preceding administration, which is incorporated by reference in the bill now before you.

The Fryingpan-Arkansas project was originally called the Gunnison-Arkansas project, Roaring Fork diversion, and was so designated in the 1950 project planning report of the Bureau of Reclamation (S. Doc. 106, 82d Cong.). It was referred to in that report as follows (p. 3):

> 4. The potential Gunnison-Arkansas project is a major unit in the comprehensive plan of development of the water resources of the upper Arkansas River Basin which is being investigated by the Bureau of Reclamation. The project is adaptable to construction by successive cumulative stages. The initial development is planned as a completely independent multiple-purpose unit that could be the first stage of a much larger project. The comprehensive project would require exportation of a relatively large amount of Colorado River water eastward through the Continental Divide to the Arkansas Valley of Colorado. The full potential uses of water in western Colorado have not been completely determined; therefore, only the amount of water assuredly beyond the requirements for development on the western slope is proposed for diversion at this time.

The Colorado Water Conservation Board, in commenting on this report, said (S. Doc. 106, 82d Cong., p. 33):

> It is recommended that this project shall hereafter be referred to as the Fryingpan-Arkansas project. Approval of this provision by eastern Colorado representatives shall not be implied as an abandonment of their expressed intention to obtain approval of a project from the Gunnison River nor shall approval of this provision by western Colorado representatives be construed as any consent on their part to the authorization of a project for the exportation of water from the Gunnison River to eastern Colorado.

The same language is quoted in the Senate committee report (No. 233, p. 2) on the companion bill (S. 300, 84th Cong.).

The recommendations of the regional director, approved by the Commissioner of Reclamation and the Secretary of the Interior (S. Doc. 106, 82d Cong.) included the following (p. 27):

> N. Suitable language be included in the authorizing document clearly stating that authorization or appropriation of funds for the project or for the continued investigations stated above shall not in any way constitute a commitment, real or implied, to further importations.

However, an amendment which I offered in the Senate Committee on Interior and Insular Affairs in the 83d Congress to effectuate this

recommendation was rejected (see Senate hearings on S. 964, 83d Cong.) The failure to include this amendment, together with the rather elastic description of the project in section 1 of the bill, and the fact that the total amount of Colorado River water which this $160 million project would bring to the lands is less than 3 inches per acre per year, and that the total relief from all sources is to be only 50 percent of the deficiency, all lead to the conclusion that the project will not stop with this initial development.

It seems reasonably clear that the door is wide open to the revival of the Gunnison-Arkansas project to divert 900,000 acre-feet from the Colorado River watershed to that of the Arkansas, that the Roaring Fork diversion is but the first unit of such a diversion, and that the change of name of this initial unit of the Gunnison project to the Fryingpan-Arkansas project does not alter that situation.

RELATION TO THE COLORADO RIVER STORAGE PROJECT

The Fryingpan-Arkansas project comes before Congress simultaneously with the Colorado River storage project. That project, as described in S. 500 as passed by the Senate, would cost over $1,600 million, and involve the construction of 6 storage reservoirs and 33 participating projects, with the implication of more to follow. The Fryingpan-Arkansas bill, from California's viewpoint, cannot now be viewed alone. It is part of an upper basin construction program costing about $2 billion, to be built in reliance upon distorted interpretations of the Colorado River compact which encroach upon the lawful water supply of the lower basin to the extent of a million to two million acre-feet per year. If the Fryingpan-Arkansas project stood alone, our position today would be the same as it was when we testified in June 1953; namely, it is not a good project economically, and we would resist its ultimate 900,000 acre-foot phase, but its initial phase, accounting for only 70,000 to 90,000 acre-feet per year of Colorado River system water, would be in the same category as the Paonia, Mancos, Provo, Colorado-Big Thompson, Eden, Fort Sumner, Vermejo, Collbran, Weber, and other upper basin projects which we have not opposed. As a matter of fact, despite widespread statements to the contrary, California had never opposed any upper basin project, and did not oppose this one, until the Colorado River storage project was recommended to Congress by the present administration. But the Fryingpan project is now before Congress simultaneously with the nearly 40 others in the upper basin proposed by the Colorado River storage project bills, and we are unable to fairly distinguish between this transmountain diversion project and the transmountain diversion projects contained in the larger bill, such as central Utah and San Juan-Chama.

In Senate Document 106, 82d Congress, the relationship between the Fryingpan-Arkansas project and the Colorado River storage project was commented upon as follows (p. 10):

> 40. As a result of the diversion of water from the Colorado River Basin, this potential initial development is consistent with the purposes of the Colorado River storage project. The extent of its relationship to the upper Colorado River Basin development and to the upper Arkansas River Basin development can be more firmly established as those developments proceed.

The testimony of Mr. Tomlinson, of the Bureau of Reclamation, on the present bill (p. 12 of his mimeographed statement) discloses, as part of the costs of the Fryingpan-Arkansas project—

> an annual cost for regulation provided by the upper Colorado River storage project of $163,000 (69,200 acre-feet at $2.35).

The issues involved in all of these projects are interrelated insofar as the interpretation of the Colorado River compact is concerned, and they might as well be all in 1 bill or separated into 30 bills, as far as their cumulative effect on the lower basin is concerned.

At the time of ratification of the Colorado River compact in 1923, the Colorado negotiator, Mr. Delph Carpenter, reported (reprinted in H. Doc. 717, 80th Cong. p. A79):

> Colorado cannot divert 5 percent of its portion of the river flow to regions outside the river basin.

The director of Reclamation reported (reprinted in H. Doc 717, 80th Cong., p. A46) at that time that—

> the probable amount of water that will be diverted annually from the upper basin in the future

would not exceed 444,000 acre-feet per annum. But the transmountain diversion projects in Colorado inventoried by the Interior Department in House Document 419, 80th Congress, exceed 2 million acre-feet, including the Gunnison-Arkansas diversion of 900,000 acre-feet, of which the bill before you represents the initial stage, and altogether these transmountain diversion projects exceed 50 percent of Colorado's total claims on the river. The aggregate of the transmountain diversion projects in the upper basin proposed in House Document 419 exceeds 3 million acre-feet.

The pending legislation consequently must be viewed in its relation to the whole.

ARIZONA VERSUS CALIFORNIA

As I stated in my testimony on the Colorado River storage project, there are about a dozen major issues between the upper basin and the lower basin pending in the case of *Arizona* v. *California*, which involve altogether as much as 2 million acre-feet of water per annum. To save time, I will not restate those here, but will annex a condensation of them to this statement.

California has moved to join, as parties, in the case of *Arizona* v. *California et al.*, the four States of Colorado, New Mexico, Utah, and Wyoming. That motion was argued before a special master, April 12, 1955, and is pending for decision. Attorney General Edmund G. Brown and I presented California's argument.

The opening argument of Attorney General Brown stated California's position as follows:

> It is fitting and proper that we Californians are the defendants in this litigation, for we are not seeking additional water for any new projects. We are merely defending our old and firmly established rights to 5,362,000 acre-feet per annum to sustain 3 existing projects: The Palo Verde Irrigation District, the All-American Canal, which serves Imperial and Coachella Valleys, and the Colorado River Aqueduct, which serves the metropolitan area on the coastal plain. We do not seek additional water for these three projects. We do not seek water for any new projects. We have only these three. Their rights are attacked by Arizona in the present suit. If Arizona were sustained, our rights would be cut back to about 3,800,000 acre-feet per annum, less than the

rights which California owned prior to the construction of Hoover Dam. The State of California will defend the rights of her projects with all the vigor at her command. These rights, we think, are protected by the Colorado River compact and the Boulder Canyon Project Act. We are conforming to those enactments, and must insist that the other States and the United States do likewise.

We have been anxious to have a decree that will settle with finality this two-generation controversy over the waters of the Colorado River system. For several years we sought the consent of Congress to an action joining the United States as a party to an action in the Supreme Court. Arizona and the upper basin States opposed that. At the very outset of the case now before you, in our return to the rule to show cause, we stated that we had no objection to the granting of leave to Arizona to file her bill of complaint, provided the United States would come into the case, and asked that the action proceed to an effective judgment on the merits. We moved for the appointment of a special master, so that the trial might proceed. The United States and Nevada voluntarily intervened. We had hoped that the four upper division States would also enter the suit of their own volition; especially since two of those States are also lower basin States and bound to the other two upper division States through the upper Colorado River compact, which contains interpretations of the Colorado River compact at issue in this suit. When they failed to intervene, we had no choice but to move the court to order their joinder, for a decree not binding on all seven basin States will not give the finality that all of us must have.

"A final settlement of this dispute over the effect on all of us of the compact, the Project Act and the water treaty with Mexico would seem to be as important to the four upper basin States as it is to us, and we are surprised that they are reluctant to join as parties. But they must be parties or an effective decree will be impossible.

The upper basin States refer in their briefs to pending legislation in the Congress to authorize a billion-dollar group of projects in the upper basin. While California has never before opposed any upper basin project, and has supported their efforts on many occasions in the past, it is apparent that there is a serious dispute as to the quantities of water which the uper basin may retain as against the lower basin under the compact. This pending legislation recognizes the necessity for ultimate litigation; it would grant the consent of Congress to joinder of the United States in some future suit to test, basin versus basin, the interpretations of the Colorado River compact which are involved in the suit now before you. The prospect is thus a second lawsuit before the Supreme Court.

We prefer that this one suit put this long controversy at rest. This case can do that, if the upper States are made parties.

We believe that all of the Colorado River States are necessary parties, not only to the adjudication of Arizona's claims to the waters of the Colorado River system, but to the adjudication of the claims of the United States, which affect all of the waters and all of the States of the Colorado River Basin.

Several of the issues in the lawsuit relate to transmountain diversions, particularly the question of the measurement of consumptive use, the question of average versus annual limitations, and the protection given by article VIII against impairment of "present perfected rights." We cannot be asked to ignore these interpretations while the Bureau of Reclamation plans projects based upon them. The more flagrant ones are summarized as follows:

DEPLETION VERSUS USE AT SITE

The Bureau of Reclamation interprets the compact, wrongly in our view, so as to measure the beneficial consumptive use apportioned to the upper basin in terms of man-made depletion measured at a distant downstream point (Lee Ferry), instead of in terms of actual consumption at the place of use, as we say is required under the Colorado River compact, the Boulder Canyon Project Act and the Mexican Water Treaty. The Colorado compact negotiator, Delph

Carpenter, supported our view in his 1923 report, citing a transmountain diversion as an example. (See H. Doc. 717, 80th Cong., p. A102.)

Mr. Carpenter said:

> As recently defined by Director Davis, of the United States Reclamation Service, it is the "diversion minus the return flow" (Congressional Record, January 31, 1923, p. 2815). Water diverted and carried out of the basin of the Colorado River by the Strawberry, Moffat, or other tunnels or by canal into the Imperial Valley is wholly consumed as regards the Colorado River, because no part of it ever returns to that stream system.

The Bureau does the reverse. Our view, and Mr. Carpenter's, applied to the Fryingpan-Arkansas project, means that Colorado should be charged with the full amount of whatever quantity is diverted each year out of the basin to the east slope. This is the way we are charged by the Bureau of Reclamation under our contracts. But under the depletion theory, for which the upper basin now contends and which the Bureau report accepts, the measure is not of the amount actually diverted by a transmountain diversion project, but the amount by which this diversion affects the virgin flow at Lee Ferry, hundreds of miles downstream. Thus, if 90,000 acre-feet is diverted, it becomes, say, only 80,000 acre-feet in reckoning at Lee Ferry, because of evaporation, transpiration and other stream losses which would have occurred in transit in a state of nature. The difference between methods of measurement is admittedly small on this project, but in terms of ultimate development of the upper basin the interpretation used by the Bureau represents an encroachment upon the rights of the lower basin amounting to 300,000 to 500,000 acre-feet per annum.

AVERAGE VERSUS ANNUAL LIMITS

A second interpretation of the compact implicit in the Bureau's calculations is the measurement of use on a long-term average basis instead of on an annual basis. Here, it would mean that the Fryingpan-Arkansas project would only be charged with, say, 90,000 acre-feet in a year in which it diverts 120,000 acre-feet if in some other year it diverted only 60,000—so as to average 90,000. I am advised that the project plans assume annual fluctuations of diversions from as low as 25,000 to as high as 112,000 acre-feet. The same interpretation is reflected in the Colorado River storage project, so as to permit upper basin uses, say, of 10 million acre-feet 1 year if only 5 million are used in another year, so as to average 7,500,000 acre-feet. We say that the apportionment in perpetuity of the beneficial consumptive use of 7,500,000 acre-feet per annum made to the upper and lower basins respectively by the Colorado River compact means "each year," not an average over a period of 34 years, which is what the Bureau of Reclamation contends in support of the Colorado River storage project. The apportionment, or reservation, of 7,500,000 acre-feet per annum against the law of appropriation, is a maximum, like a speed limit of 50 miles per hour on a highway. A sign reading 50 miles per hour does not permit one to go 60 miles per hour in some places just because he went only 40 miles per hour on some other stretch of that same road. The result of these differing interpretations in the calculation of the upper basin's right to the use of 7,500,000 acre-feet per annum is substantial, of the order of 1 million to 2 million acre-feet per annum in critical years, basin against basin.

"PRESENT PERFECTED RIGHTS": QUALITY OF WATER

Of the total of 5,362,000 acre-feet claimed by California, we allege, in the pending case of *Arizona* v. *California et al.*, that 4,950,000 acre-feet is in the category of "present perfected rights," which article VIII of the Colorado River compact declares shall remain unimpaired. We say, in that suit, that this certainly means unimpaired in quality as well as in quantity.

Colorado River water now contains nearly 1 ton of salts per acre-foot, and the quality is deteriorating as uses increase upstream. This means that if, in producing a crop, 3.5 acre-feet per acre is required, there will be 3.5 tons of salt put onto each acre of land with that amount of water each year. All this added salt must be removed by drainage or the land will sooner or later be driven out of cultivation. How much this salt content may be increased without adversely affecting at least certain of the less tolerant crops, even if adequate drainage is provided, is not known. The Fryingpan-Arkansas project and the other transmountain diversion projects would be at high altitudes, 10,000 feet above sea level in the case of the Fryingpan-Arkansas project, where the melting snows have not accumulated any quantity of salts. The deprivation of the Colorado River system of its purest water by such projects in such large quantities would admittedly result in an increase in the percentage of salts in the water at Lee Ferry, simply because there would be about the same total amount of salts at that point but less water to dilute them. The dispute is over degree. The Reclamation Bureau estimates that the increase in salt content in the lower basin will be 54 percent. It may be much greater. The list of 11 "participating projects" referred to by the Bureau has grown to more than 30, in S. 500 as passed by the Senate, plus the Fryingpan-Arkansas and ultimately, perhaps, the Gunnison diversion.

California's concern about the quality of water is well illustrated by House Document 187, 83d Congress, 1st session, the report of the present administration on the Fryingpan-Arkansas project. At page 25 appears the statement:

> Pueblo obtains its municipal water from the Arkansas River. During periods of low flows the water is of poor quality. The water is relatively hard and unpalatable.

Improvement of the quality of this "unpalatable" water is given as one of the reasons for importing pure Colorado River water into the Arkansas watershed.

But at page 83 of that document apears a table showing the "mean quality of water, October 1940 to September 1941," in which the discharge at Pueblo is shown to have a content of 0.47 tons of dissolved solids per acre-foot. To compare that with the problem faced by California on the Colorado River, see the testimony of the Bureau of Reclamation on S. 500, 84th Congress, in which they admitted that the salt content of water discharged at Lake Mead, with full use of the upper basin allotment of 7,500,000 acre-feet per annum would rise to 1.2 tons of salt per acre-foot. This would be equivalent to more than 1½ tons at Parker Dam, where the Metropolitan Water District aqueduct diverts water for domestic and municipal uses on the coastal plain, to serve some 6 million people. In other words, California homes and industries are expected to use water containing

nearly three times the quantity of dissolved solids which renders the Pueblo water supply "unpalatable."

No adequate study of these questions has been made by the Bureau of Reclamation. In the Boulder Canyon Project Adjustment Act (act of July 19, 1940, 54 Stat. 774), the Hoover Dam power contractors were required to pay $500,000 per year, the first $1,500,000 to be appropriated for studies and investigation, "including studies of quantity and quality of water and all other relevant factors." We are still awaiting such a report on quantity and quality of water.

When I testified before the Senate committee on this project about 2 years ago, in June 1953, I proposed an amendment (which was rejected), which would have directed the Secretary of the Interior to do what we thought the Adjustment Act directed him to do in 1940—investigate and report upon the effect of transmountain diversions upon the quality of water downstream.

I also proposed at that time an amendment to the effect that nothing in the act was to be construed as committing the United States to the further exportation of water from the Colorado River system. This was also rejected.

VIEWS OF ARIZONA

With respect to transmountain diversions in general, we are able to cite views from a somewhat unusual source—Arizona. The lower house of the Arizona Legislature and the Arizona State Federation of Labor have both recently passed resolutions on the subject, which speak for themselves:

RESOLUTION PASSED BY ARIZONA STATE FEDERATION OF LABOR 44TH ANNUAL CONVENTION, AT TUCSON, ARIZ., APRIL 23, 1955

1. Whereas the House of Representatives of the 22d Arizona Legislature on April 2, 1955, unanimously adopted the following motion:

"It is the sense of the house that we oppose construction of any projects to export additional Colorado River waters out of the river basin, or to take from Arizona the power revenues to be produced at dams located within the boundaries of this State, as being contrary to recognized principles of water law, and to the rights and interests of the people of Arizona."

2. Whereas, by such action the house of representatives has gone on record against such proposals as the transmountain diversion units of the upper Colorado River storage bill now before Congress to export vast quantities of water out of the river basin and also against the proposal of that bill to give to the upper basin States the hydroelectric power and the vast wealth of the power revenues to be produced at Arizona's Glen Canyon Dam site on the river; and

3. Whereas, such waters and power are necessary to maintaining and expanding the major part of the economy of Arizona on which the working people and the general population of Arizona basically must depend for their employment and vocational pursuits: Now, therefore, be it

Resolved, That this convention goes on record as endorsing and supporting the above motion passed by the Arizona house of representatives, and be it further resolved that copies of this resolution be sent to the Governor and attorney general of Arizona, the speaker of the house and president of the Arizona State Senate, the Arizona Interstate Stream Commission, Arizona State land and water commissioner, and to the Arizona congressional delegation.

The executive committee of the Arizona State CIO Political and Legislative Committee passed a resolution April 29, 1955, quoting that of the Legislature.

THE ARKANSAS VALLEY FEATURES

Our objections to additional transmountain diversion projects do not apply, of course, to the features of this project which relate only to the waters of the Arkansas River system. These provide two-thirds of the total water supply of the project. The Bureau of the Budget and the Department of Agriculture have both recommended separate consideration and evaluation of the Arkansas and Colorado River features. That has not been done.

The Budget Bureau recommended (H. Doc. 187, 83d Cong., p. 2):

> As indicated by the comments of the Department of Agriculture on the original report, under dates of October 10, 1951, and May 23, 1952, in view of the obvious high cost of importing water from the Colorado River Basin, a separate evaluation should be made of the feasibility of importing water from the Colorado River Basin, considered as an incremental addition rather than an integral part of the project.

The Department of Agriculture, in commenting upon the proposed project, reported, under date of May 23, 1952 (H. Doc. 187, 83d Cong., 1st sess., p. 169):

> It appears that the irrigation segment of the proposed multiple-purpose undertaking consists of two distinct phases. One of these is aimed at making more effective use of the water supply already available in the upper Arkansas Basin. The other is designed to increase this supply by importation of water from the Colorado River Basin. It is noted that the costs and benefits of these two phases are combined for purposes of economic evaluation. This is not in accord with the basic principles of evaluation set out in the May 1950 report of the Subcommittee on Benefits and Costs of the Federal Interagency River Basin Committee. We believe that to bring your report into line with these principles it should present the benefits and costs of all separable increments of the proposed project, and should show that each such increment is more economical than any feasible alternative. It seems particularly important, in view of the obviously high cost of importing water from the Colorado River Basin, that a separate evaluation be made of the use of such water for irrigation.

The same Department had previously reported, on October 10, 1951 (id., p. 169):

> It appears from our analysis that the irrigation segment of the proposed multiple-purpose undertaking actually consists of two distinct phases. One of these is aimed at making more effective use of the water supply already available in the upper Arkansas Basin. The other is designed to increase this supply by importation of water from the Colorado River Basin.
>
> In our opinion the former is more important than the latter. According to the report, less than half of the water now passing the headgates of the irrigation works is actually applied to farm fields. Moreover, some of the floodwaters are lost and winter diversions are excessive. Clearly there is a need for a full-scale program designed to reduce water wastage, to improve irrigation systems and practices and to capture more Arkansas River floodwater.
>
> * * * * * * *
>
> It is also suggested that this phase of the irrigation plan be evaluated separately. It should, we believe, be considered the basic irrigation program for the area. The proposal to import water should be considered as an additional increment and evaluated as such.
>
> All segments of the proposed multiple-purpose program are combined for purposes of economic evaluation. Hence it is not possible to determine, from the data given in the report, the possible effects of the separate evaluations suggested. We note, however, that the cost of the combined irrigation program would exceed $65,000 per farm (if the additional water made available is applied to 921 farms, as assumed in the calculations of benefits), or roughly $500 per irrigated acre. This high cost is, we assume, largely due to the importation feature of the combination. When such costly measures are required every possible alternative solution should be given thorough consideration.

CONCLUSION

We believe that no further transmountain diversion projects should be authorized until a limitation has been established upon the total quantity which can be diverted from the headwaters of the Colorado River system. We do not, of course, ask that the figure circulated at the time California accepted the compact, of 300,000 acre-feet, be imposed, but neither do we think that it is fair to increase that tenfold to 3 million acre-feet, as the Reclamation Bureau proposes to do. The ultimate Gunnison-Arkansas diversion would account for nearly a third of that. An impartial study of quality and quantity of water, long overdue, and ordered by Congress 15 years ago in the Boulder Canyon Project Adjustment Act, is necessary before a fair figure can be finally stated. We hope to secure one in the present Supreme Court case.

If, short of a Supreme Court decree, the upper division States are willing to accept a limitation such as that which they imposed upon California in the Boulder Canyon Project Act, to be accepted by their legislatures, we are willing to attempt to negotiate such a limitation. It should be in the same terms as Congress prescribed for us: An amount stated in aggregate annual consumptive use, diversions less returns to the river, which would thus charge the upper basin's transmountain diversions just as California's are charged; with the full amount diverted and used, not the depletion they cause downstream, and limit them to an aggregate, not an average, amount per year.

As to the amount of transmountain diversions which can be tolerated, more data is needed, and has been needed for a long time. The best way to get it may be by another method used by Congress in consideration of the Boulder Canyon Project Act: The appointment by the President of a board of eminent and impartial engineers, outside the Government, to make a report and recommendation. See the act of May 28, 1928, 45 Stat. 1011, creating the Sibert Board, and its two reports, reprinted in House Document 717, 80th Congress, pages A185, A187, A207.

The principle of protection or priority for in-basin uses, prospective as well as present, as against transmountain diversion projects is recognized in Colorado by statute (Session Laws 1943, ch. 192, sec. 1). An agreement between users on the western slope and the eastern slope, under the Fryingpan-Arkansas project, provides that if curtailment of Colorado's uses is required to fulfill the Colorado River compact, the burden shall fall first on the transmountain diversions. (See S. Doc. 106, 82d Cong., p. 22.) But this statute and this agreement protect only the in-basin uses in Colorado, and are not enforceable by any other State. The same principles ought to be extended to the protection of Colorado's downstream neighbors from the effect of Colorado's transmountain diversions.

The time has come when the issue of unlimited transmountain diversions from the headwaters of the Colorado River system must be squarely faced and fairly resolved.

Mr. Chairman, I have available also a copy of a resolution adopted by the Assembly of the California Legislature, which I should like your permission to read.

62757—55——20

ASSEMBLY JOINT RESOLUTION NO. 37, ADOPTED BY THE CALIFORNIA STATE ASSEMBLY ON MAY 2, 1955

Whereas more than 6,000,000 people of this State depend upon the Colorado River as an important source of water for irrigation, domestic and industrial needs; and

Whereas the metropolitan areas of southern California, including Los Angeles, San Diego, and some 60 other cities depend on the Colorado River for water and hydroelectric power; and

Whereas the Colorado River is the sole source of water to irrigate over 1,000,000 acres of land in this State; and

Whereas legislation is now pending in the Congress of the United States to authorize the construction of two major power and irrigation projects in the upper basin of the Colorado River at an estimated total cost approximating $1,750,000,000; and

Whereas one of these projects as contemplated by S. 500, H. R. 270, and companion bills, known as the Colorado River storage project, includes (1) the construction of 6 large dams creating reservoirs with an aggregate storage capacity of 44,000,000 acre-feet and (2) the construction of 14 or more irrigation projects known as "participating projects"; and

Whereas these storage dams are not required to serve the proposed irrigation projects but would store water for power purposes under interpretations of the Colorado River compact now being defended against by California in the United States Supreme Court in *Arizona* v. *California et al.;* and

Whereas the major irrigation participating projects are very costly transmountain diversion projects to take large amounts of the highest quality water out of the Colorado River Basin to other river basins; and

Whereas the other project, as contemplated by S. 300 and H. R. 412, and known as the Fryingpan-Arkansas project, is also a very costly transmountain diversion project to take the best quality water out of the Colorado River Basin to the Arkansas River Basin, and is the initial phase of a project to divert 900,000 acre-feet of water per annum out of the Colorado River Basin; and

Whereas both of these projects are based upon interpretations of the Colorado River compact which are now at issue before the Supreme Court of the United States in the case of *Arizona* v. *California et al.;* and

Whereas these projects, if constructed under those interpretations, would be detrimental to both the quality and quantity of water to which California has rights long established by prior appropriation as well as by contracts with the Federal Government for projects now constructed; and

Whereas both proposed projects are based upon questionable standards of financial feasibility and if constructed would cost the taxpayers of our Nation several billion dollars in the form of a subsidy to the lands which would be irrigated; and

Whereas California is the second largest taxpaying State in the Nation, and would therefore be doubly injured if these projects were authorized both by the impairment of the quality and quantity of water to which existing California projects have established rights, and by the burden of a tremendous tax load: Now, therefore, be it

Resolved by the Assembly and the Senate of the State of California, jointly, That the Congress of the United States be and it is hereby respectfully memorialized and urged to suspend further consideration of legislation authorizing the Colorado storage project and participating projects, and legislation authorizing the Fryingpan-Arkansas project until the Supreme Court decides the case now before it: and be it further

Resolved, That copies of this resolution be transmitted to the President of the United States, the President of the Senate of the United States, the Speaker of the House of Representatives of the United States, and to each Senator and Representative from California in the Congress of the United States.

TABULATION OF ANNUAL DRAINAGE TO SALTON SEA FROM IMPERIAL IRRIGATION DISTRICT AS WELL AS FROM THE TRIBUTARY AREAS IN MEXICO, INCLUDING RAINFALL AND RUNOFF FROM ONLY THOSE AREAS IN ACRE-FEET

1948	1,054,951	1952	1,297,740
1949	1,130,166	1953	1,378,422
1950	1,143,185	1954	1,304,146
1951	1,206,320		

COMPUTED ANNUAL EVAPORATION IN ACRE-FEET AS GIVEN IN PAPER BY HARRY F. BLANEY OF USDA

1948	1,230,000	1952	1,278,000
1949	1,242,000	1953	1,302,000
1950	1,248,000	1954	1,314,000
1951	1,254,000		

The above figures do not include drainage into the Salton Sea from the Coa- into the Salton Sea.

The above figures do not include drainage into the Salton Sea from the Coachchella Valley, or other area rainfall.

Mr. ASPINALL. Does that complete your statement?

Mr. ELY. Yes.

I referred in my statement to a summary of the issues between the upper and lower basin in the pending lawsuit, which I said to save time I would not read. I would like to have that printed as an exhibit to my testimony, if you please.

Mr. ASPINALL. You have heard the request.

Mr. DAWSON. Could I see the exhibit?

(The exhibit was handed to Mr. Dawson.)

Dr. MILLER. Is that a brief in the Supreme Court presentation you are presenting?

Mr. ELY. This is a summary of the issues between the upper basin and the lower basin involved in the lawsuit.

Mr. RHODES. Unless I am mistaken, this is probably the same summary offered in the upper Colorado project hearings and to which there was objection. Is it the same summary, Mr. Ely?

Mr. ELY. It is a reference to the same issues. Whether it is a verbatim copy, I do not recall, Mr. Rhodes.

Mr. ENGLE. I object.

Mr. ASPINALL. You have heard the objection.

Mr. HOSMER. Mr. Chairman, I move the document be admitted.

Mr. ASPINALL. Motion has been made that the document be made a part of the statement of Mr. Ely. All those in favor signify by saying "aye."

Opposed say "no."

The noes appear to have it——

Mr. ELY. May I ask to have included as an exhibit to my statement the views and recommendations of the State of California——

Mr. ASPINALL. Just a minute. You are just a little bit too fast for the Chair. Wait until he makes the declaration.

The motion was lost, and the statement will not be made a part of the record.

Now you make your request.

Mr. ELY. Excuse, me, Mr. Chairman. May I have included as an exhibit to my statement the Views and Recommendations of the State of California on Proposed Reports of the Secretary of the Interior

on Initial Development, Roaring Fork Diversion, Gunnison-Arkansas Project, Colorado, dated August 1951?

Mr. ENGLE. I object, on the ground, Mr. Chairman, it is all before the committee now, and there is no use larding this record up with a long-winded repetitious insertion of matters already before the committee.

Mr. ASPINALL. Objection has been made and it will not——

Mr. HOSMER. Mr. Chairman, I move it be made a part of the record.

Mr. ASPINALL. You have heard the motion. All those in favor of the motion signify by saying "aye."

Those opposed say "no."

The noes appear to have it. The noes do have it. The motion is lost and it will not be made a part of the record.

Mr. ELY. May I offer as an exhibit to my statement a list captioned "The Following Government Bodies and Organizations in California Are Officially on Record in Opposition to the Fryingpan-Arkansas Project (S. 300 and H. R. 412)," a list of 175 organizations, tabulation dated May 16, 1955?

Mr. ASPINALL. You have heard the request. Is there any objection?

Mr. DAWSON. May I see the statement?

(The document was handed to Mr. Dawson.)

Dr. MILLER. Off the record.

(Discussion off the record.)

Dr. MILLER. The list, as I note here, contains labor unions, city councils, rice growers, date growers, and many others. May I ask, do you have individual affidavits that will be presented relative to these 175 groups?

Mr. ELY. Resolutions of the governing bodies, Mr. Miller.

Dr. MILLER. You have the resolutions?

Mr. ELY. Yes. Those will be offered for the record, if you wish, or for the file as you may prefer.

Dr. MILLER. I have no objection to it being a part of the file, not a part of the record. I think we ought to know they are supported by resolutions or affidavits.

Mr. ENGLE. Are they all identical resolutions?

Mr. ELY. No, sir.

Mr. ASPINALL. Is there any further objection?

Mr. ENGLE. It seems to me, Mr. Chairman, that if the resolutions are identical, one should be put in the file so that you know what the resolution says. Now those that are not identical, of course, ought to be in the file.

Mr. ELY. I shall be happy to offer them for the record.

Mr. ENGLE. I do not want them for the record, but for the file.

Mr. ELY. For the file then.

Mr. ASPINALL. This statement will be accepted as a part of the record, providing it is substantiated by the resolutions being made a part of the file. Is there any objection?

Hearing none, it is so ordered.

(The tabulation referred to follows:)

The following Government bodies and organizations in California are officially on record in opposition to the Fryingpan-Arkansas project (S. 300 and H. R. 412):

1. **Imperial Irrigation District.**
2. **Brotherhood of Locomotive Firemen and Engineers.**
3. **Brotherhood of Railroad Trainmen.**

4. Order of Railway Conductors and Brakemen.
5. Brotherhood of Railway Clerks.
6. Brotherhood of Railway Carmen of America.
7. Brotherhood of Mantenance of Way Employees.
8. Order of Railroad Telegraphers.
9. Brotherhood of Railroad Signalmen of America.
10. Sheet Metal Workers International Association.
11. Railway Employees Department—AFL.
12. Colorado River Board of California.
13. Metropolitan Water District of Southern California.
14. Department of Water and Power of the City of Los Angeles.
15. Anaheim City Council.
16. Anaheim Chamber of Commerce.
17. Calexico City Council.
18. El Centro City Council.
19. El Centro Chamber of Commerce.
20. Holtville City Council.
21. Holtville Chamber of Commerce.
22. Imperial City Council.
23. Imperial County Board of Supervisors.
24. Imperial County Farmer Bureau.
25. American Legion, District 22, San Diego and Imperial Counties.
26. Burbank City Council.
27. Chula Vista City Council.
28. Chula Vista Chamber of Commerce.
29. Otay Municipal Water District.
30. San Ysidro Chamber of Commerce.
31. Property Owners Association of California.
32. Glendale City Council.
33. Hemet City Council.
34. Hemet Chamber of Commerce.
35. Los Angeles City Council.
36. Los Angeles County Board of Supervisors.
37. Los Angeles Central Labor Council.
38. Orange County Board of Supervisors.
39. San Diego City Council.
40. San Diego County Water Authority.
41. Rainbow Municipal Water District, San Diego County.
42. San Bernardino County Board of Supervisors.
43. San Marino City Council.
44. Agricultural Council of California.
45. Calavo Growers of California, Los Angeles, Calif.
46. Calcot, Ltd., Bakersfield, Calif.
47. California Almond Growers Exchange, Sacramento, Calif.
48. California Asparagus Growers Association, Stockton, Calif.
49. California Beet Growers Association, Ltd., Stockton, Calif.
50. California Canning Peach Association, San Francisco, Calif.
51. California Cattle Feeder's Association, Los Angeles, Calif.
52. California Cattlemen's Association, San Francisco, Calif.
53. California Date Growers Association, Indio, Calif.
54. California Fig Institute, Fresno, Calif.
55. California Fruit Exchange, Sacramento, Calif.
56. California Lima Bean Growers Association, Oxnard, Calif.
57. California Planting Cotton Seed Distributors, Bakersfield, Calif.
58. California Prune and Apricot Growers Association, San Jose, Calif.
59. California Turkey Growers Association, San Francisco, Calif.
60. California Vegetable Growers, Santa Barbara, Calif.
61. California Wool Growers Association, San Francisco, Calif.
62. Central California Berry Growers Association, San Jose, Calif.
63. Challenge Cream and Butter Association, Los Angeles, Calif.
64. Consolidated Milk Producers for San Francisco, San Francisco, Calif.
65. Farmers Cooperative Exchange, Inc., Santa Cruz, Calif.
66. Farmers' Rice Growers Cooperative, San Francisco, Calif.
67. Fontana Producers Egg and Supply Co., Fontana, Calif.
68. Hayward Poultry Producers Association, Hayward, Calif.
69. Imperial Grain Growers, Inc., Brawley, Calif.
70. Milk Producers Association of Central California, Modesto, Calif.

71. Poultrymen's Cooperative Association of Southern California, Los Angeles, Calif.
72. Poultry Producers of Central California, San Francisco, Calif.
73. Qualitee Dairy Products Association, San Diego, Calif.
74. Ranchers Cotton Oil, Fresno, Calif.
75. Rice Growers Association of California, Sacramento, Calif.
76. San Diego Cooperative Poultry Association, San Diego, Calif.
77. San Joaquin Valley Poultry Producers Association, Fresno, Calif.
78. Sebastopol Apple Growers' Union, Sebastopol, Calif.
79. Sunkist Growers, Inc., Los Angeles, Calif.
80. Sun-Maid Raisin Growers of California, Fresno, Calif.
81. Tri-Valley Packing Association, San Francisco, Calif.
82. Turlock Cooperative Growers, Modesto, Calif.
83. Coachella Valley County Water District
84. Brawley City Council
85. Brawley Chamber of Commerce
86. City of Calipatria
87. Calipatria Chamber of Commerce
88. City of Beverly Hills
89. Westmorland City Council
90. San Jacinto City Council
91. Torrance City Council
92. Costa Mesa City Council
93. Laguna Beach City Council
94. City of Chino
95. City of Compton
96. Newport Beach City Council
97. County Supervisors Association of California
98. City of Fontana
99. City of Fullerton
100. City of Long Beach
101. City of Ontario.
102. City of Pomona.
103. Santa Monica City Council.
104. Upland City Council.
105. County Supervisors Association of California
106. Las Flores Water Co., Altadena, Calif.
107. Whittier City Council.
108. City of Gardena, Calif.
109. City of Lakewood, Calif.
110. City Council of the City of El Segundo, Calif.
111. Seal Beach City Council, Calif.
112. City of La Habra, Calif.
113. National Avenue Business Men's Association, Chula Vista, Calif.
114. South Bay Irrigation District, Chula Vista, Calif.
115. City Council of Oceanside, Calif.
116. City Council of City of Escondido, Calif.
117. Escondido Chamber of Commerce.
118. City Council of the City of National City, Calif.
119. National City Chamber of Commerce.
120. La Mesa Chamber of Commerce.
121. City Council of the City of Manhattan Beach.
122. City Council of the City of Lynwood.
123. Fullerton Chamber of Commerce.
124. City Council of the City of El Cajon.
125. El Cajon Valley Chamber of Commerce.
126. Santee Chamber of Commerce.
127. California Taxpayers Association.
128. City Council of the City of San Clements, Calif.
129. City Council of the City of Brea.
130. City Council of the City of Claremont.
131. City Council of the City of Signal Hill, Calif.
132. City Council of the City of Coachella.
133. San Jacinto Valley Chamber of Commerce.
134. City Council of the City of Maywood.
135. Oceanside Chamber of Commerce.
136. City of Huntington Park.

137. Carlsbad Chamber of Commerce.
138. City Council of the City of Buena Park.
139. City Council of the City of Indio.
140. Lemon Grove Chamber of Commerce.
141. Carlsbad City Council.
142. Long Beach Chamber of Commerce.
143. City of South Gate.
144. City Council of the City of Glendora.
145. City Council of the City of Vernon.
146. City Council of the City of Placentia.
147. City of Huntington Beach.
148. City Council of the City of Culver City.
149. City Council of the City of Perris.
150. City Council of the City of Tustin.
151. City of Rendondo Beach.
152. City Council of the City of La Verne.
153. Chula Vista Downtown Third Avenue Business Mens Association.
154. City Council of the City of Corona.
155. City of Inglewood.
156. Montrose Chamber of Commerce.
157. Lincoln Avenue Water Co.
158. Rubio Canon Land and Water Association.
159. Crescenta Valley County Water District.
160. Foothill Municipal Water District.
161. City of Bell.
162. City Council of City of Elsinore.
163. City Council of City of Hermosa Beach.
164. City of Montebello.
165. City Council of City of Orange.
166. Thermal Chamber of Commerce.
167. Board of Directors of Western Municipal Water District of Riverside County, Calif.
168. Pomona Chamber of Commerce.
169. City of Hawthorne.
170. City of Palos Verdes Estates.
171. City of Riverside, Calif.
172. Lakeside Chamber of Commerce.
173. The Mountain Water Co. of La Crescenta.
174. La Crescenta Chamber of Commerce.
175. La Mesa City Council.

Mr. ASPINALL. Now, Mr. Ely, do you care to change your former request which went to having certain exhibits made a part of the record to having them made a part of the file?

Mr. ENGLE. Mr. Chairman, I make the unanimous consent request they be made a part of the file.

Mr. ASPINALL. Is there any objection?

Hearing none, it is so ordered.

(The documents referred to will be found in the files of the committee.)

Mr. ENGLE. I want to make clear why I objected to those things going into the record. I think they have no basis in the record, but as a part of the file it is perfectly all right.

Mr. ASPINALL. Does that complete your statement, Mr. Ely?

Mr. ELY. It does. Thank you, Mr. Chairman.

Mr. ASPINALL. The Chair has two questions.

One is that he noticed in the statement by Mr. Matthew that he referred to the amount of acreage to be irrigated by the Fryingpan-Arkansas as 309,000 acres and that you, Mr. Ely, in your statement referred to it as 350,000 acres. There is a discrepancy here. As it is the Chair's understanding you have worked up these statements together, which one is it you desire to rest upon?

Mr. ELY. They both derive from Reclamation Bureau figures, and I would prefer that Mr. Matthew indicate which he prefers to identify for your uses.

Mr. MATTHEW. Mr. Chairman, the Bureau of Reclamation report on the Fryingpan-Arkansas project definitely sets up a figure of 309,000 acres of good agricultural land as the area presently irrigated that is to be served with supplemental water supply. That figure is sometimes given as 322,000, but the difference of about 13,000 between the 322,000 and the 309,000 is so-called class 6 land. I believe that is what it is called in the Bureau report. So in my statement in regard to the project I have used the figure of 309,000 acres.

As far as this figure used by Mr. Ely in his statement of 350,000, I think he was merely giving a round figure for the thing generally representing the area that is to be served, but the accurate figure is 309,000 acres.

Mr. ASPINALL. That does not correspond exactly with the figure we have been using in the hearings.

Then I notice, Mr. Ely, in your statement on page 7 you referred to a statement made by the late Delph Carpenter of the probable amount of water that would be diverted annually from the upper basin in the future, that it would probably not exceed 444,000. Yet in your conclusion you referred to the fact that California accepted the compact with the understanding it would not be over 300,000 acre-feet. Would you try to correlate those figures or is there no correlation in the figures used?

Mr. ELY. The figure of 300,000 as appears from page 7 in my statement is that used by Mr. Carpenter.

Mr. ASPINALL. 440,000.

Mr. ELY. No, 300,000. The 444,000 figure is the ultimate indicated by the Director of Reclamation, A. P. Davis.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Engle.

Mr. ENGLE. Mr. Ely, I would like to read the statement that appears on page 230 of the hearings before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs of the United States Senate, 83d Congress, 1st session, on S. 964, a bill to authorize the construction, operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas project, Colorado, on June 15 and 16, 1953. That testimony begins on page 227. I am reading from page 230 at the bottom of the page, the testimony being a statement by Northcutt Ely, special counsel, Colorado River Board of California, Washington 5, D. C. The statement reads as follows:

> In conclusion, Mr. Chairman, may I say that California distinctly does not oppose this project. To the contrary, we are glad to see development in the upper basin proceed within the terms of the Colorado River compact. By the same token, we feel it appropriate that the legislation which authorizes this or other upper basin projects should, first, contain therein the same safeguards that the upper basin interests have insisted be placed in the lower basin legislation, the San Diego aqueduct bill; and second, disclaim any intent to give congressional sanction to any interpretation of any of the documents comprising the law of the river. Whether that interpretation favored us or were against us, we feel Congress should disclaim any intent to make any interpretation.
>
> Lastly, with respect to the "quality of water" question, we certainly do not ask that this project be delayed pending any investigation of the quality question, but we do feel that the time has come when the Department of the Interior should recognize the question of quality as well as quantity in its project plan-

ning. It is vital to all of us. This quality investigation should include the whole basin, not just the upper basin.

And preceding those remarks in conclusion are the suggested amendments to implement the qualifications noted in this statement.

I say that the statement is a clear statement that California does not oppose the project. "To the contrary," the statement says, "we are glad to see development in the upper basin proceed within the terms of the Colorado River compact." And since there is no suggestion in the statement that the project is not proceeding within the terms of the Colorado River compact and there is no protest on that ground, it assumes that it does.

But three separate exceptions are: One, that it contain the same safeguards that were placed in the San Diego aqueduct bill. And on pages 228, 229, and 230 of the same document are set forth the six amendments which are suggested, some of which pertain to that first safeguard.

The second safeguard is to disclaim any intent to give congressional sanction to any interpretation of the document.

Others of those six amendments relate to that proposition.

Finally, with reference to the quality of the water, amendment No. 5 as suggested would direct the Secretary of the Interior to institute studies into the quality of the water.

I call attention to the fact that the statement says, "We do not ask that this project be delayed pending any investigation of the quality question," but that the amendment be put in calling for the study.

Now I cannot help but feel that that statement, taken by its four corners, plus the six suggested amendments, is wholly in conflict with the testimony which has been given here today by you, Mr. Ely, and by Mr. Matthew, which is an across-the-board assault upon this project with reference to its economics, its engineering, and its legal basis. On all three scores this project is attacked across the board.

I have read with some interest the statement on page 6, Mr. Ely, in which there is an apparent effort to justify this change in position on the ground that the upper Colorado Basin project is now before the committee. But my recollection is that the upper basin project has been under study for years and was before us, if not precisely in the same form, in general the same form, in June of 1953. And there is no basis for a reasonable Californian to reconcile himself to the complete and abrupt change in position which has been taken by the Colorado River Board in this instance. I want to say, as one Californian, that I think we are entitled to a clear and a consistent line of action and position with reference to these developments in the Upper Basin project; that it is frustrating, and certainly something that I cannot reconcile myself to, when California witnesses come in here and in 1953 testify point blank that they are not only not opposed to this project but glad that it is proceeding, and then come here in 1955 with an across-the-board assault upon the project on its economics, on its engineering, and upon its legal bases.

There has to be some awfully good reason for that kind of shilly-shallying around. For my part, as a Californian, I simply do not like it.

I want the record, Mr. Chairman, to be perfectly clear on that, and I want the record to show what the previous position of the same witnesses has been.

Mr. ELY. May I comment upon your statement, Mr. Engle?

Mr. ENGLE. Yes.

Mr. ELY. In June of 1953 when Mr. Matthew and I testified, as you have indicated, the upper Colorado River project was represented by bills in Congress upon which no report had been submitted by the Department. As a matter of fact, reports on the Colorado River storage project bill had been bottled up in the Bureau of the Budget with adverse action, and consequently the Fryingpan-Arkansas bill stood alone at that time. The Colorado River storage project bill was not forwarded to Congress with the recommendation of the administration until December or January following.

As I have stated in my statement, if the situation today were as it was in May and June of 1953, we would take the same position today we did then, namely, this is not a good project economically, we would oppose its 900,000 acre-foot phase, but so long as it is limited to 70,000 acre-feet, we would stand aside and not oppose it in exactly the same manner as we stood aside and did not oppose the Paonia, Mancos, Provo, Colorado-Big Thompson, Eden, Fort Sumner, Vermejo, Collbran, Weber, and other upper basin projects. It does not stand here alone now. It is part of one ball of wax with the Colorado River storage project, which invloves many times as much water and, if adopted in the form in which submitted, would commit the Reclamation Bureau and the Congress to a program which can only be justified if interpretations of the Colorado river compact are assumed which are diametrically opposed to the interests of the State of California. Consequently, we must oppose the Fryingpan-Arkansas bill as we have to oppose the Colorado River storage project bill. It makes no difference whether they are in 1 bill or in 30. We do not draw any distinction between the Fryingpan-Arkansas project because it is in a separate bill as compared with the other transmountain diversion projects which are in the Colorado River storage project bill.

Our position, we feel, with all due respect to your viewpoint, is not inconsistent.

Mr. ENGLE. Let me say to you, Mr. Ely, that you would not refuse your son a bicycle on the ground some day he might want a Cadillac or a fleet of Fords, and the idea you have to oppose the Fryingpan-Arkansas because the upper basin people may want something bigger and more grandiose, which Congress is considering and which it may never authorize, is just complete bunk, in my opinion.

Mr. ELY. Well, we disagree with you respectfully but emphatically.

Mr. ENGLE. Yes, let us put that in the record—respectfully but emphatically.

Mr. ASPINALL. The Chair recognizes the gentleman from Nebraska, Dr. Miller.

Dr. MILLER. Mr. Ely, I always enjoy you and Mr. Matthew and your corps of assistants behind you when you appear before this committee. I think you are one of the most persuasive individuals, and you come well documented, and you are one of the most high powered lobbyists, may I say in the kindest way, to appear before this committee.

I always read your comments with considerable interest, and then, as a layman, a doctor, who has no interest at all in upper Colorado or in the Fryingpan-Arkansas, but who has been on this committee

for 13 years listening to water arguments, I frequently become concerned, because I think the last report showed in the United States some 320,000,000 acre-feet of water that runs off in the ocean every year without being used, which is quite a waste of our resources when people need water.

Now the thing I want to come to is this: In reading over your statement, the people in the upper Colorado States have a compact. I think you agree that they have entered into a compact allocating water available to the upper Colorado States.

Mr. ELY. Yes.

Dr. MILLER. And the State of Colorado has been allocated a certain percentage of that water. Now Colorado comes before this committee and says, "We would like to use some of the water that has been allocated to us. We want to use the water that has been allocated to us over in X irrigation district."

Then California comes along and says, "We do not want you to do that. You have got a compact, but you just cannot use that water according to the agreement entered into with the lower States and the upper States on the use of the water."

How am I, as a layman, to sit here and calmly say, "California has a right to tell Colorado they cannot use the water if they want to use it"? How do I justify that?

Mr. ELY. Mr. Miller, first let me respond to your very kind personal comments by saying——

Dr. MILLER. I am sincere about it. I envy you in your position.

Mr. ELY. That is very kind of you indeed.

Dr. MILLER. And I am always delighted that you appear before the committee because I think the lobbyist's record that must be filed shows that you are one of the highest paid lobbyists that appears in Washington, and I am envious of you, but I compliment you because you do have ability. If anything, you are underpaid. I would suggest they pay you more. [Laughter.]

Mr. ELY. I would not discourage that last suggestion, Mr. Miller.

First, let me respond to what I trust are very kind personal comments.

I regard it as an honor to appear before you and your committee here, and have for many years. While a good part of the time, unhappily, I have to present a viewpoint with which you and other members of the committee are in disagreement, I am nevertheless received here with courtesy, and I try to prepare my cases with justice to the case and with justice to the committee. I think you are entitled to have cases that are fairly documented and fairly prepared presented here.

As to the question you have asked about California's concern with Colorado's use of the water under the upper basin compact. It is quite true that the upper States have agreed among themselves on a division of the water which they think they are entitled to under the Colorado River compact, but subject to the Colorado River compact which was approved by the Boulder Canyon Project Act. That basic and underlying compact is a division between the two basins.

Now the difficulty, Congressman Miller, is that the upper basin States in dividing what they regarded as their entitlement under the basic Colorado River compact——

Dr. MILLER. Do you not use the word "regarded" a little lightly? Has not that been pretty firmly fixed?

Mr. ELY. No. That is the precise point to which I am now addressing myself.

Dr. MILLER. I see.

Mr. ELY. The difficulty is that the upper basin in dividing what they regarded as their entitlement under the Colorado River compact, the basic document, make certain interpretations of that basic document to their own advantage and to the disadvantage of the lower basin amounting to a million to 2 million acre-feet per year, in our view. Consequently, we cannot sit quietly while Congress goes ahead with authorization of projects in the upper basin which are founded upon what we call distorted interpretations of the underlying document.

Dr. MILLER. Are some of those problems before the Supreme Court now?

Mr. ELY. They are, sir. Last April 12, 13, 14, and 15 we argued before the special master the question of whether the four Upper States are necessary parties to that lawsuit, for that very reason, and that motion of California is under advisement.

Dr. MILLER. I appreciate that. I understand it, Mr. Ely. But when Mr. Dexheimer, the Commissioner of Reclamation, was before our committee a few days ago, he testified that since the Hoover Dam has been built about an average of 4 million acre-feet of water was running through the dam without being used. In other words, about 84 million acre-feet of water since Hoover Dam has been built has not been used. California did not even use it. Perhaps it is a little more than they could use. And one of my arguments for building the Fryingpan-Arkansas or the upper Colorado project was that here was enough water to fill those reservoirs twice over. And some day California, when you have maybe 50 or 60 million people instead of the population you have now, you are going to need a drink of water, and there will not be any place to get it.

You ought to wholeheartedly support saving up every drop of water we can in the upper Colorado, not only so those people can get their own supply of water, but so you can get an additional supply of water, particularly in southern California.

That was my point there.

Mr. ELY. Might I comment, Dr. Miller?

Dr. MILLER. Yes.

Mr. ELY. On the latter point, California is limited by an agreement with the Congress made in the Boulder Canyon Project Act to a maximum of 4,400,000 acre-feet of water per year of the waters apportioned by article III (a) of the compact, plus one-half of the excess or surplus unapportioned by the compact. So while it is quite true that our needs in California will very greatly exceed that, there is no way short of a revision of the whole compact and contractual setup, which we do not seek, which would permit us to expand our uses in the way you are describing them.

Dr. MILLER. You are entitled to one-half of the surplus, are you not?

Mr. ELY. That is correct.

Dr. MILLER. And this water has been running to the ocean, this 84 million acre-feet runoff, which I would say is surplus. You could properly be using some of that.

Mr. ELY. There you get into one of the questions before the Supreme Court. The water that has been going to waste is not, in the sense

of the compact, surplus water. The surplus is the water available in excess of the apportioned water.

Dr. MILLER. Now I understand you are here wanting to place some limitation on the upper States who have entered into a compact for their use of water so California can get some benefits they may or may not be entitled to.

Mr. ELY. The suggestion made at the close of my statement is of a limitation act applied particularly to transmountain diversions. We would like to see some ceiling placed upon transmountain diversions.

Dr. MILLER. You have changed your position of 2 years ago when you thought the project ought to go forward, and now you are here asking a strict limitation be placed upon it and no progress be made.

Mr. ELY. When the project was here before, as I said, it stood alone. If the project stood alone without the Colorado River storage project, our position would be the same as it was before.

Dr. MILLER. Thank you very much.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will be in recess until 2 p. m.

(Whereupon, at 11 : 45 a. m., the subcommittee recessed to reconvene at 2 p. m., of this same day.)

AFTERNOON SESSION

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will be in order for further hearings of H. R. 412.

The Chair recognizes the gentleman from California, Mr. Sisk.

Mr. SISK. Mr. Ely, with reference to your testimony this morning, I believe the amount of water that is to be diverted from Colorado Red River Basin in this particular project amounts to some 69,200 acre-feet; is that correct?

Mr. ELY. For this project plus about 15,000 that goes into another use (Twin Lakes). The figure runs between 69,000 and about 90,000.

Mr. SISK. I think the Bureau's testimony shows 69,200.

Mr. ASPINALL. If the gentleman will yield—so we will understand what we are talking about—the Twin Lakes diversion has priority for more water than they are able to take through their present facilities. There is a possibility that there may be a few thousand additional feet of water carried through the facility on the western slope to the present existing transmountain diversion at Twin Lakes. That is where the water comes from but that has nothing to do with the amount of water, as I understand it, which Fryingpan-Arkansas is requesting, under this program.

Mr. SISK. The point of my question there was, of course, to bring out the fact that actually either we are in agreement that the amount of water to be diverted here, is actually a very small amount of water, and would have very little effect, in itself, on downstream operation, either by the upper basin or the lower basin States; is that not correct?

Mr. ELY. Yes, I endeavored to make that clear. That is true in the initial stage.

Mr. SISK. With that in view, I naturally was a little bit surprised to see what attitude you people are taking because I had been under the impression from some of your statements before that you would not necessarily oppose a project with this small amount of water involved.

Now, with reference, of course, to your stand on it, I understand it is because of the fact that there are certain other bills before the committees, that there are other proposed projects which might or might not affect water in the Colorado River Basin.

Now, of course, in a consideration of this particular bill, I feel that the committee, and particularly I, as a member of that committee, feel that I would have to consider this bill on its merits. I do not have to be an attorney. I know that you are, and that you are a good attorney, and that when a man is on trial, I think in general, you do not drag in the supposition that he may or may not have been robbing something else but he is charged with that particular offense which has been committed.

In a sense we must consider this particular bill upon its merits as such and not consider that it is tied to some of these other proposed projects, or projects that may or may not, as I say, be built.

Don't you feel that that is a fair way to approach this bill?

Mr. ELY. I can understand your viewpoint, Mr. Sisk, and it is one which we entertained in 1953 when this bill did stand alone, and it is the attitude we took when its predecessors came before Congress, such as the other projects I mentioned, the Paonia, Mancos, Provo, Colorado-Big Thompson, Eden, Fort Sumner, Vermejo, Collbran, Weber, and so on.

As a matter of fact, I appeared here and testified in favor of the Paonia project. As I endeavored to make clear this morning, had the Fryingpan-Arkansas limited to 84,000 acre-feet, or 64,000 feet, continued to stand alone, we would have stood aside now as we stood aside in 1953 with respect to that bill; but unfortunately it is not now alone. It is here with 33 participating projects in the Colorado River storage project, plus 6 great reservoirs, and to our mind, the fact that the Fryingpan-Arkansas project is in a separate bill does not modify the fact that we are now confronted by about 40 upper basin projects, simultaneously, all based upon the same distortions of the Colorado River compact—at least from our point of view—and the fact that they are in 1 bill or 3 bills or a dozen bills doesn't modify the problem which confronts us. The same problems are involved in all of them, and that is why we are here with respect to this one.

Mr. SISK. In other words, you feel, then, as a member of this committee, that it is not possible to be for one single part of these proposed projects, then, and as a result we should be against them all. That is the stand I understand you are taking.

Mr. ELY. Yes, with two modifications. First, we think that no action should be taken upon any of this great upper basin program until the issues in the law suit are determined, but with respect to transmountain diversion projects in particular, which have an even greater danger from our viewpoint than in-basin projects, because of their effect on the quality of water, we think that either by agreement, if that is possible, or by decree, some ceiling should be placed upon the transmountain diversions from the high Rocky Mountain areas from whence comes the pure water. That is one of the factors that distinguishes this, along with the other transmountain diversion projects.

I think it would be unfair for us to single out any one of these participative projects, many of which are small, viewed by themselves, and say, "This one is satisfactory and the others are not."

It is a cumulative effect, all based upon these interpretations of the compact which disturbs us, Mr. Sisk.

Mr. SISK. I would like for you to understand the position that any of us must take as members of the committee and I do not necessarily agree with your reasoning that you cannot be opposed, or you cannot be for one of these projects without embracing them all, because I am sure quite a number of Members of Congress certainly will oppose parts of the proposed projects we are talking about, now, outside of this bill, since that has been brought into the picture, and at the same time, though, in all probability, will support justifiable projects.

That, of course, was the point that I was trying to make in the beginning, that I feel there are justifiable and feasible projects that will not violate the compact from a legal standpoint, and that as individuals, we might be able to support it without further necessity of supporting the thing en masse, if you see the point.

Mr. ELY. I understand your viewpoint and we have sympathy for it. We would like to arrive at a position like that, too, but the difficulty, as I see it, is that all of these projects are predicated upon interpretations of the compact which are absolutely fatal to the lower basin. The fact that any one project, alone, does not take a very big bite out of us is not the point. The fact is that a claim is staked out here on behalf of the upper basin for waters upon which the lower basin is dependent for survival.

The fact that each one in itself is small does not alter the deadly character of the ultimate claim under which they are all proceeding.

It is in the same spirit that you have expressed that Mr. Matthew and his people have analyzed this project, to try to find what features of it might go ahead without encountering our problems. Mr. Matthew has presented figures this morning, which I feel the Bureau should have done in response to the Bureau of the Budget's mandate and the suggestion of the Department of Agriculture in their reports on this project over the last several years, to see whether it is not possible to put together a feasible project to use the Arkansas River water, which doesn't concern us, and to go ahead with it without waiting for the determination of the controversy on the Colorado River.

It develops that some 70 percent of the water supply of the project comes from the Arkansas, and that a feasible reclamation project and one serving the municipal needs on the eastern slope can be put together, using Arkansas River water, and we would like to see that go ahead. We have no objection to that. Then let the transmountain diversion question be resolved separately.

Mr. ASPINALL. It is your position that they go ahead with facilities on the eastern slope that might be necessary in the case that they brought along the transmountain diversion unit of this project later on, and it would still be a feasible project if you just used the Arkansas Valley area?

Mr. ELY. May I ask Mr. Matthew to comment on that? It is my understanding that that is correct, but I would like Mr. Matthew to comment.

Mr. MATTHEW. It seems there is a possibility of developing a project on the Arkansas, from the Bureau's report, through conservation and regulation through the Pueblo Reservoir, which would have material benefits and would be financially feasible under existing

law, and it could go ahead, independently of the transmountain project.

Mr. ASPINALL. That is not what I asked. I asked if you could go ahead independent of the western slope facilities at this time and then later on, when the transmountain diversion part of this project might be authorized, that the construction under your program would permit the tying in of the other without any additional construction works, unless it might be some additional reservoirs.

Mr. MATTHEW. It can follow along, entirely independently and tie in to the development of the Arkansas River.

Mr. ASPINALL. With just the construction of a few additional reservoirs that might be contemplated in this legislation?

Mr. MATTHEW. That is right, just the additional works of the collecting features and the reservoirs up there as proposed.

Mr. SISK. Let me pursue that matter just a little further.

As I understand it, it is your opinion that if the project on the Arkansas River could be built now excluding the transmountain diversion, that would be all right, and at some later date the transmountain diversion could be tied in, assuming the enabling legislation was passed. That it could be tied in in an adequate manner, workable and so on, at a later date. Is that correct?

Mr. MATTHEW. That is right.

Mr. SISK. Without additional expense?

Mr. MATTHEW. Well, the expense of the new works, that is all. There would be no additional expense on the works constructed on the Arkansas River, if that is what you mean.

In other words, Pueblo Reservoir would be complete in itself, and if they put in the municipal delivery systems they would be complete in themselves?

Mr. ASPINALL. If I might ask another question at this point could the extension be so constructed that it would take care of the additional use it would be put to, if the transmountain diversion were later authorized?

Mr. MATTHEW. That is right.

In other words, the Twin Lakes system would be enabled to, according to the Bureau's report, develop and divert another 15,000 acre-feet, about, of water, from the Colorado River system, by means of the works that are constructed by this project.

Mr. ASPINALL. I was not thinking of that. I was thinking about the enlargement of the reservoir.

Mr. MATTHEW. That would be a part of the project as proposed.

Mr. SISK. Now, Mr. Matthew, I believe either you or Mr. Ely this morning in your statement referred to quite a number of miles of open canals and it seems to me, as I recall, from the testimony of the Bureau down here, that the engineering designs and so forth call for tunnels or closed canals in most cases, and not for open canals, in areas where they would be clogged with snow and ice. Is that not correct?

Mr. MATTHEW. No, that is not correct, Mr. Sisk. There was a good deal of confusion before the committee in regard to the various questions and discussions on that matter. The testimony that you refer to was with reference to the collecting system on the west slope and I think even the chairman indicated he had the understanding there were open canals over there. That testimony was corrected by Mr.

Powell, who pointed out that the project plans provide in large measure for covered conduits on the west side, but the Arkansas power canal is designed as an open canal.

Mr. SISK. I believe their testimony, though, was clear, in that they stated from their experience with the Colorado-Big Thompson, and certain other projects that they have had experience with, that they did not anticipate any trouble due to ice or anything of that kind. That is correct is it not?

Mr. MATTHEW. No, I do not believe it is, Mr. Sisk.

Mr. SISK. I am referring to their testimony. As I understand their testimony was that they did not anticipate any trouble on that.

Mr. MATTHEW. I think that you could infer that from their testimony, yes, but not on the experience of the Colorado-Big Thompson, the entire design of the system on the east slope was changed from open canal to covered conduits and tunnels before they started construction up there. That was on the basis of the fact that it was decided that the difficulties of winter operation would make it impossible to get the power production they wanted there without having covered conduits, and it was testified in a former hearing on this project that that was one of the reasons for the large increase in cost on the Colorado-Big Thompson.

Mr. ASPINALL. I understood there was a question of the physical feasibility if these canals were not covered. Yet, now the statement is made that perhaps you can have the Arkansas unit without the transmountain diversion.

Is it true that these canals would be less feasible if you did not have the additional water from the western slope to firm up the stream in the canals, because of the additional water?

Mr. MATTHEW. The Arkansas power canal has nothing to do with the Arkansas River development. The Arkansas River development is done completely with the Pueblo Reservoir. That is the unit that will conserve and re-regulate the waters of the Arkansas River.

The Arkansas Power Canal has to do with one thing only, and that is to develop power. That is its main objective.

Mr. ASPINALL. And it wouldn't be in opertion, as I understand it then?

Mr. MATTHEW. No, it would not be in operation on the Arkansas River development.

Mr. SISK. Mr. Ely, in the discussion here with reference to the availability of water and water that might be diverted as it might apply to the Colorado River compact and so forth, you mention here that the maximum—and now we are referring to some proposed projects, or projects which in your mind and in the minds of your board people, has caused them concern—I believe you figure that the total of that project even if the Gunnison project were built, would be some 900,000 acre-feet, is that correct?

Mr. ELY. That is correct. If the Gunnison diversion followed the Fryingpan-Arkansas, in the ultimate development of the project before you, the total diversion would be on the order of 900,000 acre-feet, as I understand it.

Mr. SISK. As I understand your testimony, you have fear that this particular project—I refer to the bill before us, the Fryingpan-

Arkansas project—is just the first step in authorization, possibly, of the Gunnison?

Mr. ELY. That is correct. We take, Mr. Sisk, at full credit the belief and assurances of our friends in Congress who assert to the contrary, that there is no intent to enlarge this project, but the Bureau of Reclamation's reports are based on the assumption that the Gunnison will follow. As I indicated in my testimony, the total relief to be given by the Fryingpan-Arkansas project is nowhere near approaching the asserted needs of the area to be served. We think it is as sure as night follows day that they will be back, and no matter in what good faith the present proponents of this project assert that they won't—and I accept their good faith completely—we are face to face here with the opening wedge of a much greater transmountain diversion.

Mr. SISK. It is my understanding you people feel that all these projects should be held up until such time as the Supreme Court makes a decision in the case that is now before them?

Mr. ELY. We say that particularly, Mr. Sisk, of the transmountain diversion projects, and the storage reservoirs.

Mr. SISK. It is, is it not, correct that under questioning of our chairman here, before, with reference to the Colorado River project, that you testified that there was something over 2 million acre-feet of water that would not be concerned—that is 2 million acre-feet of available water—in the upper basin which would not be concerned with any decisions handed down by the Supreme Court?

Mr. ELY. I think I recall the testimony to which you refer and that is substantially correct: The aggregate we say that can be safely used in the upper basin without reliance on Glen Canyon or other holdover reservoirs, required to meet the requirement of article III (d) of the compact, is of the order of 4,300,000 acre-feet; the projects already authorized or under construction in the upper basin would use something like 2½ million, leaving a substantial margin available for use within the upper basin without the need for the great holdover storage reservoirs. For that reason, we questioned whether the construction of these great reservoirs, which will intercept our water supply and dole it out to us under an interpretation of the contract that we cannot stomach, are really necessary for any water-conservation purpose.

My recollection is that I indicated that to the degree that these so-called inbasin participating projects could be justified and built on their merits, we were not particularly concerned with them, any more than we were with the ten or so upper basin projects I have already enumerated, such as Paonia, and Mancos. But our concern with the Fryingpan-Arkansas, and the Gunnison-Arkansas, and the other great transmountain diversions is of a different category. They affect the quality of water as well as the quantity.

Mr. SISK. Are you basing this purely on the quality of water?

Mr. ELY. No, Mr. Sisk, but that is one of the major problems that trouble us about large transmountain diversions.

Mr. SISK. I can appreciate the possibility of some effect there. As I understand, your testimony today is going to refer back to the testimony before this committee on the other question then. There are certainly a million and a half to two million acre-feet of water they

are entitled to use that is not being put to use at the present time and it is flowing down the river.

Even if we anticipated the Gunnison project in addition to the Fryingpan-Arkansas, there would still be a lot of water left there, and with that fact in mind, I still cannot quite see the point of an all-out objection to, even say this 69,200 acre-feet here.

I know you probably are going to say, "Well, you are still tying it back to the upper Colorado project," but that is a different kettle of fish and you certainly cannot consider that in connection with this bill.

Mr. ELY. Mr. Sisk, let me make two points here, with regard to this quantity of use to which the upper basin could safely expand without affecting us.

First, I would like to enter the general caveat, in all of this discussion, that when we make our estimates, we have to grope in the dark with respect to the Indian claims asserted in the Supreme Court suit. If the court should hold that the Indian rights are outside of the compact and come ahead of all of us, then both the upper basin and the lower basin are in terrible shape. We cannot tell you what water can be used upstream safely or downstream safely.

We would all face a first mortgage in favor of the Indians, in such event, of undetermined size.

Secondly, may I say, I cannot give you any assurance that my opinion, or any other lawyer's opinion, is going to be sustained by the court as to the interpretation of the compact.

Governor Johnson, of Colorado, is on record, for example, with a very thoughtful, and thought-provoking statement on the Colorado River storage project, in which he made this statement, with which not everyone would agree but it indicates an answer to one of your questions——

Mr. ASPINALL. Just a minute. He did not say he agreed with it, himself.

Mr. ELY. That is correct. He said, "under the 7-State compact the upper states must deliver at Lee Ferry in each 10-year period 75 million acre-feet to the lower states and 7.5 million to Mexico, before they can use one drop of water themselves, beyond what they used before the 7-State compact was ratified.

"In the current 10-year period that will leave only 3,250,000 acre-feet per year for their total use. In a previous 10-year period they would have 4,150,000 acre-feet. In 1902 the upper basin States under this formula would have no water at all."

That ends the quotation.

Now, that view may or may not be sustained by the Supreme Court.

We assert, both in my presentation here and in the court, an assumption which is far more favorable to the upper basin than are the figures that I have just quoted.

Now, we may prove to be completely wrong ourselves. If the figures as Governor Johnson has used them are correct, then the margins given in my answers to you just do not exist.

Mr. SISK. What I started out to try to state on this Fryingpan-Arkansas project, means of course, that that is the thorn in the side of possibly a lot of objectors to this particular bill, the fact that there are other projects proposed.

Now, the thing that I had in mind was that such amounts of water as proposed in the bill that we have before us, certainly is nothing to alarm any of us. After all, as a Representative of the State of California I am just as concerned in the protection of California's water as any other member of the California delegation and I will try to defend every drop of water that we have coming to us under the Colorado River compact or from any other compact, Mr. Ely. On the other hand, as you know, as I said before, I feel we have to live and let live, and these people are entitled to make use of such water as they are entitled to under the Colorado River compact.

Above and beyond that, I feel that we as individuals, members of this committee as well as individual Members of Congress, then must make up our minds with reference to the economic feasibility or engineering feasibility, or other features of this unit possible, and not base it upon the idea or the theory that it may rob us of something we have been receiving.

Now, the Department came down here and testified that during the life of Boulder Dam, or Hoover Dam, I should say, there have been over 80 million acre-feet of water poured out in the Pacific, not used by the upper basin and not used by the lower basin. That 80 million-odd acre-feet certainly needs a change. There is no need for that water to go to waste when the people in Colorado or somewhere else want it and could use it if methods could be provided for the use of it.

I feel, whether I be a Representative of California or a member of some other State, we should grant these people a right to a hearing and if the project is feasible, economically and otherwise, then we should so support it.

Mr. ELY. Mr. Sisk, down to the point where you referred to the Reclamation Bureau testimony, I don't think there would be any great difference in opinion among any Californians; as to the general statement, where we might fall apart, is on the peril point.

I tell you as one lawyer that we are placed in peril to the extent of 1 million to 2 million acre-feet per year in the lower basin, by the upper basin's interpretations of the basic Colorado River compact. Only the Supreme Court can decide whether we are right or the upper basin is right in the interpretation of that compact.

In the Supreme Court case, it happens, ironically enough, that the figures that Governor Johnson uses, and which indicate the peril point as far as they are concerned, are much more likely to materialize if Arizona prevails than if we do. This is because Arizona's interpretation of the compact, in certain respects, throws a greater burden upon the upper basin, with respect primarily to the Mexican burden, than does our interpretation. But there are so many unknowns that can only be resolved by the United States Supreme Court that I certainly could not give you an opinion, nor could any other lawyer, upon which any of us could rely as to the ultimate outcome.

I can give you an opinion as to the peril points insofar as the lower basin of California is concerned. I say that the upper Colorado River storage project and the Fryingpan-Arkansas project, regardless of the quantities involved, are based upon interpretations of the compact which stake out for the upper basin a claim which exceeds what we think they are entitled to claim by 1 million or 2 million acre-feet per year.

We are in somewhat the position of a man who sees his yard being fenced off by a neighbor who says "Don't worry, I don't intend to use this for a long time to come." That is not the point. The claim is made, the right is asserted, and we must resist before the billions are invested under which those rights will mature.

When you speak, Mr. Sisk, of the Reclamation Bureau testimony, I did not happen to be here to hear the statement that 84 million acre-feet had been wasted to the sea, during any particular period of time. I do not question your recollection of that, but since I have not seen the figures I cannot give you a very intelligent comment on them. I will say, however, that a great portion of the water that has reached the Gulf of California has reached it under the requirements of the Mexican Water Treaty, or the demands of the Mexicans for water.

The storage of Lake Mead has been drawn down some 15 or 16 million acre-feet from its peak. I have been told that the Bureau of Reclamation has been unable to hit the target of the requirement of 1,500,000 acre-feet at the border of Mexico, by a very wide margin; that it is proving impossible to so meter the water at Davis Dam as to limit quantities arriving at the Mexican boundaries to the precise amount Mexico is entitled to under the treaty, on a day-to-day or monthly schedule.

There are large and growing diversions of water in Arizona by people who have no contracts with the Secretary of the Interior and who are therefore unlawfully using the Colorado River water, which neither the State of Arizona nor the Secretary of the Interior have found any way to stop.

Mr. SISK. That was testimony that they offered in answer to questions by Dr. Miller, making the argument that it was in excess of 80 million acre-feet.

Just to wrap up the testimony, though, you do agree, Mr. Ely, that there is something close to 80 million acres of water that the upper basin is entitled to, that would not be in litigation at present in the Supreme Court.

Mr. ELY. I cannot give you that categorical assurance. I tried to state as precisely as I could, Mr. Sisk, what our views are about that.

Mr. SISK. According to your own figures a little bit ago.

Mr. ELY. Without restating all that I just tried to state carefully, I could not give you a categorical answer.

Mr. ASPINALL. The Chair recognizes the gentleman from California. Mr. Hosmer.

Mr. HOSMER. I think that only the bleakest smog can avoid a view of this thing as one link in the long chain to draw the lower basin to an area of oblivion, and as such it must receive concern from us equal to that of any other link in this chain. I also believe that anybody who heard and understood the testimony of the Interior Department's attorney with respect to the Department's views under the interpretations of the compact at legal questions involved here, could not but be shaken with alarm for the lower basin and its future with regard to the water.

Mr. CHENOWETH. The gentleman will admit that this project will not in any way change any of the interpretations of the compact or make any change whatever in the construction of the compact?

Mr. HOSMER. I understand that, but I understand also that anything that is done in the upper basin presupposes one or another

interpretation of the Colorado River compact, and the totality of things that are intended in the upper basin, are on suppositions that we believe are not only contrary to what the actual rights are, but have within them the greatest danger to us below.

Mr. CHENOWETH. You know that the compact will be the same after this bill as before?

Mr. HOSMER. I understand that, and I understand also that inasmuch as some of the items in the lawsuit are involved in the bill before us, and that portion of the bill which involves them cannot be separated out, as possibly and probably should be done.

Let me say this further, that I believe that the upper basin should do it of its own volition, because in my opinion the upper basin is killing off reclamation in the country, by making demands that are excessive in relation to the physical and legal availability of water in this area.

I have no further questions, Mr. Chairman. I think the witnesses have handled the situation very well, but I do wish to say that there is no virtue in constancy of position, when your facts are changing.

Mr. ASPINALL. If my colleague will yield, we have not had any development in the valley.

Mr. HOSMER. The Secretary has managed to get his fingers around the throat fairly well and still hang on.

I think in this bill here, the upper basin should make the first move in the right direction by splitting off the Fryingpan portion of this thing and keeping the Arkansas portion in the bill.

I think also that the upper basin should, by recognizing that there is a problem, negotiate it with the lower basin, as the testimony has indicated the lower basin has been at all times ready to do.

Mr. ASPINALL. The gentleman must admit, though, that the eastern slope of the Colorado is just as much a part of the Colorado River Basin in this regard, at least, as is the Pacific coast, which is entirely another watershed, over in Long Beach, San Diego, and Los Angeles. Isn't that true?

Mr. HOSMER. It is true in one sense and not true in the other sense, which is the problem of upper transmountain diversion, which goes back to the quantity and quality—particularly the quality of water—situation on the western slope and in the entire Colorado River Basin.

Mr. ASPINALL. I do not wish to argue that point, but I say to the gentleman and also to the witness on this question of the water and the purity of water, you may talk about the content of the minerals in the water and all that, but the water that comes off of some of these high slopes that you folks talk about being so pure, carries minerals and carries sheep and cattle dung more than a lot of other waters that you have in mind.

So when you talk about quality of water, we are getting into a different question than just purity.

The Chair recognizes the gentleman from Arizona, Mr. Rhodes.

Mr. RHODES. Thank, you, Mr. Chairman.

Mr. SISK. Will the gentleman yield?

Mr. RHODES. I yield.

Mr. SISK. I would like to say to my friend from California, I appreciate the fact that he disassociates himself from me with reference to his stand on this, but I would like—and I can appreciate his

reasons for it, because I realize that the southern part of our State has problems.

However, I would just like to comment for one moment with reference to his feeling, which I am sure is sincere on his part, that Colorado is tending to kill off reclamation by these projects. I, as he knows, have been quite concerned—in fact I would say the prime reason that I have made some statements with reference to these projects has been that I have been concerned with the fact that some people in southern California, because of certain statements and certain propaganda, if you will permit me to call it that, that has been put out, is probably bringing about the greatest reaction in reclamation than anything that has happened. That, of course, has been—and I am sure the witnesses are aware of it because I am not saying anything here today that I have not said to them personally—that I have been rather alarmed, due to the damage that I feel they have caused to reclamation in the Nation. I do not necessarily agree that Colorado has proven to be an enemy of reclamation, due to the fact that they brought out so many projects.

I thank the gentleman for yielding.

Mr. HOSMER. Will the gentleman yield?

Mr. RHODES. I yield.

Mr. Chairman I am glad that my State has not been accused of killing reclamation, Mr. Chairman.

I would like to ask a few questions of the witnesses.

Mr. Ely, as to the quality of water, does the lower basin have any duty to the Republic of Mexico, concerning the quality of water which we deliver under the terms of the Mexican Water Treaty?

Mr. ELY. Not in the lower basin as such. We think the United States does, under the terms of the Mexican Water Treaty.

Could I make this discussion off the record?

Mr. RHODES. As far as I am concerned you may.

Mr. ASPINALL. If it won't take too long.

Mr. ELY. It will be very brief but I would not like to place off the record part of what I have to say.

(Discussion off the record.)

Mr. ELY. Now, if I may go back on the record.

Mr. Rhodes, you will find in a paper published as a Senate document entitled, "Light on the Mexican Water Treaty, from the Ratification Proceedings in Mexico," which I compiled and which was published as Senate Document 249, 79th Congress, 2d session. This contains the interpretations, insofar as they were made public, on the part of the American and Mexican negotiators on that point.

Mr. RHODES. Since the diversions of water into the coastal area of southern California are transmountain diversion and outside of the basin, would you say that there is any possibility that in the future the Republic of Mexico might supply the same arguments to such transmountain diversions as you are now applying to diversions in Colorado?

Mr. ELY. In their own ratification proceedings in Mexico the Mexican negotiators made clear to their Senate that the Mexican Government, in their interpretation was entitled to water of good quality, and served notice they would make that claim at an appropriate time.

Mr. RHODES. Isn't it true that the diversion of water north of the border preceded in time the diversion south of the border?

Mr. ELY. That is correct. Of course, by the time the water reaches your people and ours, Mr. Rhodes, it is not of very good quality, anyway, compared with the quality of the water available in the upper basin. Anything we do is not going to impair the quality substantially. The Mexican border is not a burden falling upon the lower basin as such. It is a responsibility of the United States, as such.

Mr. RHODES. It is a matter that will have to be of concern to the whole basin.

Mr. ELY. That is correct, in my judgment.

Mr. RHODES. Now, as to the testimony this morning, concerning your reasons for, in this Congress, opposing Fryingpan when you did not in the 83d Congress, I believe you stated one reason was because we now have the upper Colorado storage project before us which encompasses the use of a great deal more water than any project which was before the Congress at the time you made your previous statement? Is that substantially what you said?

Mr. ELY. Yes, it not only uses a great deal more, but plants the seed for still further uses in the future, and much greater transmountain diversions.

Mr. RHODES. Thinking primarily of the Gunnison diversion.

Mr. ELY. Not necessarily that alone. The Colorado River storage projects—storage features, Glen Canyon and so on, are not required for the participating projects named in the bill. Even in the enlarged S. 500 that came over from the Senate, the storage dams are only necessary from a water conservation standpoint if still more projects are built. We regard the Colorado River storage project as staking out a claim to the full 7.5 million acre-feet or more based on the upper Colorado River interpretations of the compact, which to our mind really require the use of about 9 million acre-feet of water per year.

Mr. RHODES. As I recall your testimony in the Senate on the upper Colorado storage project, you agreed that the upper basin did have a right to use 7.5 million acre-feet of water per year.

Mr. ELY. Subject to what we regard as the overriding requirement of article III (d), the guaranty at Lee Ferry, and subject to the requirements of the Mexican Water Treaty.

Mr. RHODES. And you interpret III (d) as requiring 7.5 million acre-feet each year be delivered and not on the average over a period of years?

Mr. ELY. No; the difference of opinion of average over annual calculations does not relate to article III (d) but III (a).

III (d) requires that the States of the upper division shall not deplete the flow at Lee Ferry below 75 million acre-feet in any 10 years. The difference of view as to average versus annual calculations does not relate to that, but to whether their apportionment under article III (a) of 7.5 million acre-feet per annum is a ceiling applicable to each year or whether they may exceed that in some years because they have used less in others, averaging out their uses at 7.5 million acre-feet.

Mr. RHODES. And your thought is that it is a minimum rather than a maximum.

Mr. ELY. The 75 million acre-feet for 10 years guaranteed under III (d) is a minimum. The 7.5 million per annum apportioned to the upper basin under article III (a) is a maximum, in our view.

Mr. RHODES. The upper Colorado River storage project as it is now before this Congress does not provide for the beneficial consumptive use of anywhere near 7.5 million acre-feet of water, unless you regard that water when it is stored for power purposes, or regulatory purposes, is at that time used in a beneficial, consumptive manner. Is that the point?

Mr. ELY. I think your statement is correct.

Mr. RHODES. So you do feel the upper Colorado River storage project does provide for uses that may exceed 7.5 million acre-feet a year, considering that concept?

Mr. ELY. Yes; the provision of such tremendous storage capacity can only be justified from a water-conservation standpoint on the assumption that the second and third stages of some of these great consumptive-use projects will be built, and not merely the initial phases named in S. 500, or named in H. R. 412, now before you.

Mr. RHODES. Mr. Ely, looking at it in the worst possible light, how many acre-feet of water do you think might be awarded to the Indians under this Arizona versus California case, provided the subject does arise?

Mr. ELY. This is a difficult question to answer. We have endeavored to smoke the Department of Justice and the Interior Department out on it, and I can only give you a guess. The Government pleads a diversion right of approximately 1,700,000 acre-feet for Indians in the lower basin. They have not yet pleaded anything in the upper basin, but I have seen estimates in H. R. 419, 80th Congress, of the general order of 1 million acre-feet. Thus we may be talking about total Indian claims to diversion rights of the general order of 2.5 to 3 million acre-feet. I am not justifying the size of those claims but simply trying to measure the magnitude of the claim asserted.

As to how much of that diversion would be translated into "consumptive use." I haven't seen any figures. I would suppose the consumptive use would be not less than half and perhaps two-thirds of the total diverted, so we may be talking about an Indian claim, measured in consumptive use of something of the order of 2 million acre-feet, throughout the basin.

Mr. RHODES. On the last page of your statement in the conclusions, you indicate that insofar as this particular project, or this phase of the project was concerned, that there would be very little opposition from your particular interests, but that, as I understand the statement to read, you fear the possibility of deeper expansions because of the things you mention.

Mr. ELY. Yes, sir, and also the fact that the Colorado storage project has overtaken this one in point of time and we look upon them all as one ball of wax.

Mr. RHODES. So you are unqualifiedly opposed to this project?

Mr. ELY. Yes, sir. I should not perhaps say unqualifiedly. First, we have endeavored to separate out the Arkansas features. We are not opposed to those. And with respect to the transmountain diversions we do not say dogmatically that there is no solution. The Supreme Court decree may give us one. Short of that, it is possible, although certainly not very probable, but it is certainly possible, that the States might agree upon some limitation on transmountain di-

versions in the upper basin. That is one of the gaps in the Colorado River compact.

Mr. ASPINALL. Will my colleague yield at that point?

Mr. RHODES. I yield.

Mr. ASPINALL. I believe, Mr. Ely, in hearings concerning the Colorado River program I asked you the direct question of whether or not you would be compelled to take some action to oppose the construction of the project, providing it was authorized. You suggested, at least, that you would. Meaning, of course, that you would have to go into court. Your opposition to the Fryingpan-Arkansas project goes to that extent as well.

Mr. ELY. I think it was Mr. Rhodes who asked me that question and I told him I could not give him any clean-cut answer to it. I cannot give you a clean-cut answer, either, as to whether we would endeavor to go into court to enjoin, let us say, the Fryingpan-Arkansas project.

We are certainly doing our best at this moment to get you into court in the present suit.

Mr. ASPINALL. I asked the question as one having to do with any transmountain diversion, and your answer at least at that time led me to believe that your position was that you would have to oppose, even by court procedures, any transmountain diversion.

Mr. ELY. I could say that we would certainly have to reserve all of our rights to do so, Mr. Aspinall. I cannot give you any forecast and have no authority to do so, as to what we would do in court with respect to any one of these projects.

Mr. ASPINALL. Thank you.

Mr. RHODES. Mr. Chairman, if I recall the colloquy that you mentioned, I asked the question which you have just raised and the gentleman from California, at my left, objected on the basis of it being irrelevant, incompetent and immaterial and before the Chair could rule, Mr. Ely interposed the answer, "I am unable to say."

Mr. ASPINALL. If you look through the hearings you will find also reference to my question as well.

Mr. RHODES. I have no further questions, Mr. Chairman.

Mr. ASPINALL. The Chair recognizes the gentleman from Colorado, Mr. Chenoweth.

Mr. CHENOWETH. I want to associate myself with my colleagues on the committee who have expressed their pleasure in having you with us, Mr. Ely, and you, Mr. Matthew.

Mr. ELY. Thank you.

Mr. MATTHEW. Thank you.

Mr. CHENOWETH. I completely disagree with your position, but I respect your opinions. You are expert in your field and it has been a real pleasure for me to discuss these matters with you. I regret that you have not been able to see your way clear to support this project, as I believe you should and I believe California should.

I would like to say a word relative to the attitude taken by Mr. Engle from California and my colleague, Mr. Sisk, of California. I appreciate their attitudes and positions. It indicates clearly, of course, that there is a division of opinion in California concerning these projects.

I also want to say a word concerning my colleague, Mr. Hosmer. Even though he disagrees, he has sincerely tried to be helpful in

working out some solution to this problem and I appreciate his cooperation.

Mr. Ely, I am a little puzzled concerning your position and the position of the State of California, concerning this project. I think your standing as a water lawyer, is well known.

When you, representing the same interests that you do now, on the same project, 2 years ago, stated without equivocation, that you favored the project, and now, today, tell the committee that you are opposed to the project, it gives me some concern, and I must state I am a little puzzled to know just what has prompted that change.

We have had no change in the project. We have had no change in the circumstances surrounding the project, so far as I know. I am curious to know just what brought about the complete reversal of your former position.

Mr. ELY. First, Mr. Chenoweth, may I respond to your very gracious personal comments. I certainly, personally, would be a lot happier if we were on the same side.

Mr. CHENOWETH. So would I.

Mr. ELY. I think I speak for all of our people in saying we regard you as not only a highly competent and formidable adversary but as a very fair one.

Mr. CHENOWETH. I deeply appreciate that.

Mr. ELY. I will try to give you fair answers.

When we testified in 1953, we indicated then that the State of California had made no objection to a series of 9 projects in the upper basin, in addition to the bill which ratified the Upper Basin Compact, making at least 10 upon which we had stood aside.

And when we testified on the Fryingpan-Arkansas project, Mr. Matthew and I, in the spring of 1953, the Colorado River storage project was not actively before Congress. It is true that bills had been introduced, but the Bureau of the Budget at that time, as in the preceding administration, had taken a dim view of the Colorado River storage project and bottled it up.

The State of California had filed with the Interior Department its comments upon your project, the Fryingpan-Arkansas. Those had been transmitted to the Secretary of the Interior and Congress, and later were printed as part of House Document 187, 83d Congress, and they appear at page 154. I might say this was the official position of the State of California, at that time. It said:

> 3. The State of California favors congressional authorization of the initial development (Roaring Fork diversion) of the Gunnison-Arkansas project and the construction with Federal funds consistent with the national welfare (a) if the project qualifies under criteria, policies, and procedures established by the Congress, and (b) if the diversion and utilization of the waters of the Colorado River system by and through the project works will not impair the rights of the State of California or any of its agencies to the waters of that system as defined and set forth in the Colorado River compact and related documents and laws, or will not adversely affect the quality of such waters to which California has rights.

There were other provisions of the comments of California, but that is a pertinent one that I would like to refer to here. As I said this morning, if the Fryingpan-Arkansas project stood alone, if the Colorado River storage project had not come upon us, I think our position today would be just as it was 2 years ago. We have leaned

over backward to avoid conflict with any of these relatively small projects as they came along.

Mr. CHENOWETH. You knew of the efforts being made to promote the Colorado River project. You had received a favorable report by the Bureau of Reclamation at that time.

Mr. ELY. The Bureau of Reclamation may have rendered a favorable report, but the Interior Department and the Bureau of the Budget did not. This administration, as far as we knew in June 1953 was not prepared to clear that project.

Mr. ASPINALL. If my colleague would yield right there, Fryingpan-Arkansas 2 years ago was tied closer to the Gunnison-Arkansas than it is today, wasn't it?

Mr. ELY. No, I do not think so.

Mr. ASPINALL. Do you think events that have happened since then have taken Fryingpan-Arkansas as such, further away from the original Gunnison-Arkansas as proposed?

Mr. ELY. I think the situation in that respect has not changed, then and now, from our viewpoint. The Fryingpan-Arkansas was simply a change in name of the first unit of the Gunnison project.

Mr. ASPINALL. Then that really is not one of the reasons you are opposing the project, is it If you could have supported it 2 years ago——

Mr. ELY. In our testimony then we stated we would oppose the second phase of the project, Mr. Aspinall.

Mr. ASPINALL. I understand that.

Mr. ELY. I stated that this morning, again.

Mr. ASPINALL. I understand that, but also this morning you related it to the possibility of the Gunnison-Arkansas becoming a reality.

Mr. ELY. That is correct.

Mr. ASPINALL. And you don't believe that it is further removed, today, from that possibility than it was 2 years ago?

Mr. ELY. No, I don't, Mr. Aspinall. I am sure that it is in your mind and in the mind of Mr. Chenoweth and your colleagues, but I don't think over the long pull, Mr. Aspinall, there is any possibility of divorcing the two.

Mr. CHENOWETH. I appreciate the contribution of my colleague, the chairman of the committee. Has there been any development in the last couple of years, Mr. Ely, which has brought the Fryingpan closer to the Gunnison project?

As Mr. Aspinall pointed out they are probably further separated now. Certainly they are no closer together.

Mr. ELY. I am aware of no change in either direction, Mr. Chenoweth, if I may say, 2 years ago I offered an amendment when I testified before the Senate, to carry out recommendation N of the regional director of the Bureau of Reclamation, giving the assurance that there was no commitment, real or implied, in favor of further trans-mountain diversions, and that amendment was rejected.

Mr. CHENOWETH. In your testimony given June 16, 1953—and I quote—I believe Mr. Engle referred to the same quotation this morning "In conclusion, Mr. Chairman, I state California distinctly does not oppose this project."

Now you knew then there wasn't any threat of a future Gunnison-Arkansas—you didn't make any reference to it in this approval of the project and I know you are too good a lawyer to overlook any possible

objections that might have been raised. I am sure you would have been just as loyal to your client, then, and just as faithful and just as efficient as you are, today.

Mr. ELY. Thank you, sir.

I think the hearings then, including the submission of the State of California's official comments, we made it very clear that we would oppose the Gunnison 900,000 acre-foot project.

Mr. CHENOWETH. But we don't have the Gunnison-Arkansas project before us, today. We haven't anything to propose, today, insofar as the Gunnison-Arkansas is concerned. Why don't you cross that bridge when you get to it?

Mr. ELY. Mr. Chenoweth, I can appreciate your inquiry, but we think that this is just the first shoe. We don't want to be in a position of waiting for the second shoe to drop.

Mr. CHENOWETH. Can you give us any tangible proof that this is the nose of the camel under the tent? Can you tell me of anything that has happened in this intervening time? Has there been any overt action on the part of any one, to promote the Gunnison-Arkansas project?

Mr. ELY. There has been a consistent threat throughout all the Reclamation Bureau reports, Mr. Chenoweth, which does tie the two together.

It is quite true at times they give assurance they are not thinking about the big one right now, but the State of Colorado's own water conservation board has gone on record with a resolution saying that the agreement between the east and west slopes is not an abandonment of the desire of the east slope for the Gunnison project.

Mr. CHENOWETH. May I read this language as contained in the operating agreement, adopted by the Colorado Water Conservation Board, which speaks officially for the State of Colorado, regardless of what opinion I may have or others. This board speaks officially for the State of Colorado.

This development—

referring to the Fryingpan-Arkansas project—

is designed as a self-contained unit and its construction would not imply a commitment for developing future water supplies in the Gunnison River Basin for diversion to the Arkansas River Basin.

So that is a complete disclaimer as to the Guinnison-Arkansas project.

Colorado approves this statement but such a statement weighs to the region for claiming the name of the project as the Bureau recommends.

Diversion from the Fryingpan River to the Arkansas has no relation to the Gunnison River. It is not proposed under this self-contained project to divert water to the Arkansas River from the Gunnison River. The identification of the project on the cover of the report and as used throughout the report "Initial Development, Gunnison-Arkansas Project, Roaring Fork Division, Colorado" is a misnomer and may lead to unwarranted complications. In addition to the recommended change in the project, Colorado requested that the project be authorized as the Fryingpan-Arkansas project.

Now I think that is about as plain language, Mr. Ely, as can be written and certainly that ought to certainly dispel any doubts or fears that you may have that this is just the entering wedge for any other project.

Mr. ELY. Mr. Chenoweth, my doubts and fears are immediately reinstated because the same document—that is Senate Document 106, page 33, from which you quote the action of the Colorado Water Conservation Board says "It is recommended that this project shall hereafter be referred to as the Fryingpan-Arkansas project. Approval of this provision by eastern Colorado representatives shall not be implied as an abandonment of their expressed intention to obtain approval of a project from the Gunnison River nor shall approval of this provision by western Colorado representatives be construed as any consent on their part to the authorization of a project for the exportation of water from the Gunnison River to eastern Colorado."

I think it would be unfair to leave the lower basin at the mercy of an internal Colorado agreement which on its face is not any settlement at all of this issue of the Gunnison diversion but which is open to resettlement internally in Colorado, at any time.

Mr. CHENOWETH. The western Colorado representatives made it very clear, I thought, that they didn't construe this as any recommendation on their part of any consent to the Gunnison project.

Their approval would have to be obtained. I can't conceive the Colorado Conservation Board approving the project without their consent.

Mr. ELY. We would like a stronger bulwark than the internal situation in Colorado changing from time to time. The western people might or might not agree with the eastern people, but, whether or not they did, we would be affected by the exportation.

Mr. CHENOWETH. If you can cite me one instance where there has been any overt act on the part of any one interested in the development of this project, leading toward development of the Gunnison-Arkansas project, then I would be willing to give some credence and some weight to what you are saying. Otherwise I cannot, Mr. Ely, because I don't believe you can present any such evidence. I tried when the Bureau witnesses were here and when the witnesses from Colorado was here—I made a special point to try to bring that out and I think you heard their testimony the other day where they emphatically and specifically denied any such efforts at that time.

Mr. ELY. The views of the Bureau change from time to time. What may be feasible for them to accomplish one day might not be feasible the next day, and vice versa.

When the time comes for the Bureau of Reclamation to propose the Gunnison project, they can read these same documents and find no prohibition against their submission of such a project at a future time, if they felt it justified.

Mr. CHENOWETH. But you were not concerned about that 2 years ago.

Mr. ELY. We were concerned about it and said so, but it was not confronting us side by side with the Colorado River storage project.

Mr. CHENOWETH. Why are you taking a different attitude today?

Mr. ELY. Primarily because of the Colorado River storage project.

Mr. CHENOWETH. Why are you connecting this project with the Colorado River storage project. You understand these projects were developed entirely separately and independently of each other. The Fryingpan-Arkansas project was developed by the Denver office of the Bureau of Reclamation. The Colorado River storage project

was developed by the Salt Lake City office of the Bureau of Reclamation.

Mr. ELY. I think that is probably true of a number of the projects that are now included in the Colorado River project. Several were developed by different regional offices of the Bureau, such as the San Juan Chaura unit.

Paragraph 40, Senate Document 106, p. 10, itself, refers to the interconnection in this language:

> As a result of the diversion of water from the Colorado River Basin, this potential initial development is consistent with the purposes of the Colorado River storage project. The extent of its relationship to the upper Colorado River Basin development and to the upper Arkansas River Basin development and to the upper Arkansas River Basin development can be more firmly established as those developments proceed.

And in testimony on H. R. 412, of the bill now before you, a representative of the Interior Department in giving the cost of the Fryingpan-Arkansas project said that "An annual cost for regulation provided by the upper Colorado River storage project of $163,000 (69,200 acre-feet at $2.35)" is included.

The projects are related financially. The degree to which they are connected in their water operations is left open by paragraph 40 for further determination.

Whether the Fryingpan-Arkansas project was in S. 500, or in H. R. 412, or whether the 33 participating projects in S. 500 were separated out into 33 bills, does not affect the aggregate impact upon us, whether they are in 1 bill or 2 bills or 40 bills.

We are concerned by the fact that the upper basin is staking out a claim for waters of the Colorado River system in the aggregate of these projects, which is inconsistent with our interpretations of the Colorado River compact now at issue in the United States Supreme Court.

Mr. CHENOWETH. But the Fryingpan-Arkansas project wasn't offensive to California. You expressed support through your personal appearance and in the official report of the State.

Mr. ELY. The conditions set up in the State's formal report at that time are consistent with whatever we are now telling you, with respect to quantity and quality of water. The project standing alone is not a serious threat with respect to either. It is standing in company, now, however, with the Colorado River storage project, and with the implications of much greater projects to follow, as contained in S. 500's storage program. We are threatened both as to quantity and quality of water.

Mr. CHENOWETH. You are anticipating a great deal here, Mr. Ely.

Mr. ELY. Well, we have to.

Mr. CHENOWETH. This may never happen.

Mr. ELY. We have to, Mr. Chenoweth. This is a $2 billion program, in the aggregate, which provides for storage reservoirs under the Colorado River storage project——

Mr. CHENOWETH. You are talking about the Colorado River storage project now.

Mr. ELY. That is correct, sir.

Now the fact that some small projects are in the Colorado storage project, and in the Fryingpan-Arkansas in a separate measure, does not alter the fact from our viewpoint that we are confronted by a

colossus of development in the upper basin, all based upon interpretations of the compact which are destructive of our interests.

Mr. CHENOWETH. I still contend, Mr. Ely, that you have not given a satisfactory explanation for the change in your position. If you allege the development of the upper Colorado River project—which of course was in the offing at the time you appeared 2 years ago—it was pretty well along at the time of your first appearance.

Mr. ELY. It was in the offing but safely bottled up in the Bureau of the Budget and we had no expectations that the Eisenhower administration would reverse the Truman administration on that sort of issue.

Mr. CHENOWETH. I don't believe you have justified this change in policy.

Now I want to refer to the quality situation for a moment. I think that you admitted when you appeared here before the committee in opposition to the upper Colorado River storage project, that the amount of salinity to be added by this project was very insignificant, that you could practically ignore it. I think about 10 pounds per acre-foot. In your statement you mention there is about a ton per acre-foot now.

Mr. ELY. It is approaching 1 ton.

Mr. CHENOWETH. It is such a small amount I am surprised you are making reference to it.

Mr. ELY. The effect on quality of water of any one of these projects alone is not great; added altogether it is great. The Bureau of Reclamation itself anticipates a 54 percent increase in the solid content of the water reaching the lower basin.

As I indicated this morning, if we are approaching one ton, we are already at a quality of water twice as bad as that of Pueblo, and yet one of the reasons for the bill is to improve the unpalatable water that Pueblo now has to contend with. That quality in the lower basin will steadily deteriorate. We think it is inconsistent for the United States on the one hand to be giving as one of the justifications for a $100 million investment in transmountain diversion, here, the improvement of the water supply for Pueblo, when on the other hand the effect the increase of transmountain diversions in the upper basin will ultimately produce a water supply in the lower basin containing three times as much solid matter as that with which Pueblo now contends.

Mr. CHENOWETH. This project will make no material contribution to the solid matter in the river.

Mr. ELY. That is true of so many of these small projects, one by one; it is the aggregate which concerns us.

Mr. CHENOWETH. Assuming this project was on the western slope of the Colorado and there was no transmountain diversion involved.

Mr. ELY. No transmountain diversion?

Mr. CHENOWETH. Would you be opposed to the project?

Mr. ELY. No, I think standing alone, again, standing alone, we would not.

Mr. CHENOWETH. Is it the transmountain diversion you are objecting to?

Mr. ELY. It is the fact that we are now confronted with the whole ball of wax, the Colorado River storage project, not one project but

34, counting this one, plus the great storage reservoirs and the implications of many more to follow.

Mr. CHENOWETH. I know you want to be fair but I think it is unfair to make reference to "this ball of wax."

This has been a separate and independent project from its inception.

Mr. ELY. From your viewpoint I can understand, but from ours we can not separate them.

Mr. CHENOWETH. Two years ago you did and you had no objection to the project then.

Mr. ELY. We are concerned with the quantity and quality left to us and it is immaterial whether the project that impairs the quality or takes away the quantity is authorized by one bill or another. The effect is the same.

Mr. CHENOWETH. Is there anything that could be done to satisfy you that this is not the forerunner of the Gunnison project, that this is not one big ball of wax, and that we are not going to do anything to prejudice or damage California? Is there anything we can do to convince you of our position?

Mr. ELY. So far as my personally being satisfied is concerned, I would take your word for it instantly, but you and I do not control this matter.

Mr. CHENOWETH. Is there anything we can do?

Mr. ELY. As time goes on, the Bureau of Reclamation generates one project after another and sooner or later it will be back with the Gunnison project and I don't know of any way that you or I can prevent it.

Mr. CHENOWETH. I wholly disagree with you, Mr. Ely. I do not think you give us any evidence here to support your position.

Mr. ELY. There is nothing in the Bureau's reports which indicates any contrary intent.

Mr. CHENOWETH. Both Mr. Aspinall and myself feel unconvinced.

Mr. ELY. The people now in charge of the Bureau say they do not intend to try to persuade you to authorize the Gunnison project, but there is nothing which precludes that as an ultimate intent.

Mr. CHENOWETH. If they do that they will have to start all over again and obtain the same permission and same consent of the western slope users and eastern slope users and California will again be called upon to express her position and go through this whole procedure again.

Mr. ELY. That is right.

Mr. CHENOWETH. Then why do you anticipate all of that, now? Why don't you wait until you are threatened with real danger? You admit you are not now. You could then oppose any other project.

Mr. ELY. That was the viewpoint we did take in an effort to assist you 2 years ago, Mr. Chenoweth.

Mr. CHENOWETH. And I wish you would stay with it. I think you are still justified in staying with your original attitude and in my opinion you are making a mistake by not staying with it your first position.

Mr. ELY. We put off the evil day of conflict with the 900,000 acre-foot project. Today we are faced with a two billion dollar development in the upper basin. We must look to the legal principles upon

which all of these projects are premised and those legal principles are hostile, to a deadly degree to our water rights.

There is one report after another coming out from the Bureau of Reclamation which indicates that this Gunnison project is not a dead duck. The report on Cliffs-Divide project, referred to by another witness the other day, contemplates what will be done in this contingency or that, in the event of construction of the Gunnison project.

Mr. CHENOWETH. What you are referring to are certain inventories or statements made by the Bureau of Reclamation of certain projects that have been suggested from time to time?

Mr. ELY. No.

Mr. CHENOWETH. These are not projects that the Bureau is actively working on today?

Mr. ELY. Yes.

Mr. CHENOWETH. They are actually working on the Gunnison project?

Mr. ELY. No; the Cliffs-Divide project, Colorado.

Mr. CHENOWETH. If the Bureau is now engaged in further promotion of the Gunnison project I would like to know about it. I have no such information. I would like to be brought up to date upon it. If you have such information I wish you would present it to the committee.

Mr. ELY. If you will look at the Bureau status report on the Cliffs-Divide project, they speak of the alternatives they have under consideration and you will find that the Gunnison project is not the dead duck that you and I might like to think it is.

Mr. CHENOWETH. We will have a Bureau witness before the committee again for cross-examination and I will see if I can elicit any information from the witness on that point.

Mr. ASPINALL. If my colleague would yield.

Mr. CHENOWETH. I will be glad to.

Mr. ASPINALL. Would you say, Mr. Ely, if the Cliffs-Divide project became a reality, there would be very much feasibility to the Gunnison-Arkansas project?

Mr. MATTHEW. I will answer that. This report is a status report of reconnaissance of a large number of potentialities and most of them are competing, in whole or in part. This report includes the Gunnison project as one of the projects still actively under consideration as one of the competing projects.

Mr. ASPINALL. If the Upper Colorado River storage and development programs should become a reality, even in the most modest ambitions that the people might have, and then these participating projects should become a reality, then the chance of Gunnison-Arkansas, or South Platt are practically nill, isn't that right?

Mr. MATTHEW. I have not studied that enough to answer the question adequately.

Mr. ASPINALL. You know what the call would be upon the river basin in the Upper reaches if these participating projects became a reality, and you know there would not be any water left, then.

Mr. MATTHEW. I would have to check that by making more of a study than I have made, of these reports. They have a lot of them out. They have never been available to the lower basin for study.

Mr. ASPINALL. This report has been available to the lower basin just as much as it has to the upper basin.

Mr. MATTHEW. No, sir, they have never been made available. They are just used up there locally.

Mr. ASPINALL. Thank you.

Mr. ELY. Mr. Chairman, might I comment on one point Mr. Chenoweth made: It impresses me, Mr. Chenoweth, that the end result of this $100 million of transmountain diversion features of the Fryingpan project is, after all, to get 3 inches of water per acre per year on the lands that need a supplemental water supply. Now, to me that is not a very substantial contribution to the solution of their water shortage in the Arkansas Valley and it would seem perfectly logical to me that the next step is to impart a much greater quantity from the Colorado River to give complete coverage to their shortage.

I just cannot as a practical matter believe that the Government would spend $100 million to get 3 inches per acre per year over into the Arkansas Valley.

Mr. CHENOWETH. This is very important water. You heard these witnesses testify the other day that the water may mean the difference between a crop and no crop at all.

Mr. ELY. That is true, but——

Mr. CHENOWETH. You may be critical of the project and the State of California might be critical but our people in Colorado are very much concerned over this project and that is why I feel all the facts should be brought out. That is why I still contend your position is untenable here, and I believe you should maintain the same position you originally asserted. I do not think you are justified in switching your position on this project. I feel in the process of that change, irreparable damage is being done not only to the cause of reclamation, but to the friendly and cordial relations which have existed between our two States. I just think there is a feeling that California is not justified in opposing this project, particularly after you did endorse the project 2 years ago.

Mr. ELY. The statements of California two years ago were as I read them to you. It was on conditions that the quantity and quality of water available to the lower basin should not be impaired.

Mr. CHENOWETH. You do admit, don't you, Mr. Ely, that regardless of the outcome of the controversy now before the Supreme Court that there is ample water allocated to the State of Colorado under the upper Colorado compact, that will take care of this project, regardless of the outcome of the case.

Mr. ELY. If this project had priority ahead of all other Colorado projects, what you say might be correct.

Mr. CHENOWETH. What do you mean by priority?

Mr. ELY. If Colorado has so much water that this 70,000 acre-feet will not be at risk, no matter how much Colorado might be cut down, that is one thing, but as I understand the agreement between the east and west slope the transmountain diversion shall be the first to feel the impact of any curtailment of Colorado's uses that come about in consequence of the Mexican Treaty burden.

Mr. CHENOWETH. How does that affect California?

Mr. ELY I thought your assertion was there would be plenty of water for this project, no matter what happens. That the 70,000 acre-feet is so small that no matter what happened, this project's water supply is safe.

Mr. CHENOWETH. This amount will not be jeopardized in any event.

Mr. ELY. The water for the Fryingpan-Arkansas transmountain diversion may be seriously jeopardized, if we understand the east-west slope agreement correctly, that in the event Colorado's water supply is curtailed, in consequence of the Mexican Treaty burden, which it surely will be, the transmountain diversions are to be curtailed first. (See H. Doc. 187, 83d Cong., p. 38, par. 15.)

Now, I do not know what the relative position of the Fryingpan-Arkansas diversion is in point of priority, as compared with other transmountain diversions in the State of Colorado. It is not our business.

Mr. CHENOWETH. I have never heard the question of priority mentioned before, in transmountain diversion.

Mr. ELY. I refer only to the east-west slope agreement, quoted at page 38 of H. Doc. 187, 83d Congress, which I do not purport to be an expert on.

Mr. CHENOWETH. In this Cliffs-Divide report—I am not familiar with that; Mr. Aspinall is more familiar with that than I am—isn't that just a memorandum?

Mr. ASPINALL. If my colleague will yield, they made a report on the Gunnison River. That is one report. It was a reconnaissance report and they came out with the Gunnison-Arkansas.

Then they made a report in the northwestern part of the State. That is another one.

The Cliffs-Divide study is simply a reconnaissance study of the main stem of the Colorado River from the Utah line to the continental divide.

Mr. CHENOWETH. It does not refer to the Gunnison-Arkansas project as such?

Mr. ASPINALL. It does not refer to the Gunnison-Arkansas as such, but on the other hand there would be certain implications insofar as the amount of water is concerned.

Mr. ELY. On page 112 of this document which is called Status Report, February 1954, Cliffs-Divide Project, Colo., appears under the caption, "Gunnison-Arkansas project," the following:

> A report issued by region 7, Bureau of Reclamation, in June 1948, on the Gunnison-Arkansas project presents plans for the exportation of water from several tributaries of the Roaring Fork of the Colorado River as well as from numerous tributaries of the Gunnison River. The plan for initial development as presented in that project has been superseded by the plan for the Fryingpan-Arkansas project. In addition to the Fryingpan-Arkansas project diversions, the ultimate development plan for the Gunnison-Arkansas project would include diversions from Crystal River and Difficult, Castle, and Maroon Creeks, all of which are tributory to Roaring Fork. Diversions from these streams would first be made into the Gunnison River Basin and thence, together with water collected in that basin, into the Arkansas River Basin.

Mr. CHENOWETH. Has anything been done to carry out the report? Have there been any further studies on the Gunnison-Arkansas that you know of?

Mr. ELY. I do not know, Mr. Chenoweth. This status report is dated only last year, February 1954.

Mr. CHENOWETH. I think we can clear that up very quickly when the Bureau witnesses appear.

My colleague, Mr. Sisk referred to the amount of water which is now going to the Salton Sea. Is that figure correct?

Mr. ELY. No.

Mr. CHENOWETH. Some 80 million acre-feet? How much water actually is running there now?

Mr. ELY. There is confusion here. I think Mr. Sisk referred to the water going into the Gulf of California and not into the Salton Sea.

Mr. CHENOWETH. How much goes into the Salton Sea?

Mr. ELY. I do not have the exact figure, but I can supply it for the record.

Mr. CHENOWETH. What is the amount of evaporation there?

Mr. ELY. The amount flowing into Salton Sea is of the general order of perhaps a million acre-feet a year. I am subject to correction, and I will supply the figure.

Mr. CHENOWETH. Has the amount risen constantly?

Mr. ELY. The level of the Salton Sea fluctuates. It is, in general, I think, rising, as it is expected to do. That is a closed basin. The drainage from the Imperial Valley and the Coachella Valley in the United States and the Mexicali Valley in Mexico, all discharge into the Salton Sea.

The quality of water question is involved, because, as the quality deteriorates, the salt content rises. That can be taken care of only by drainage, and the proportion of the inflow that must be discharged from the project, to preserve the "salt balance," rises.

In the Interior Department's report on the central Arizona project, for example, they assumed that about 20 to 25 percent of the water that came into the project must be permitted to escape to carry out salt to preserve the salt balance, and that is probably what we will face in the Imperial Valley. The percentage may be higher as the quality deteriorates.

In any event, the area around the Salton Sea has been withdrawn and set aside for that very purpose. There is no other place for the water to go. The surface will rise. There is nothing abnormal about that. The Salton Sea is a sink, two-hundred-and-forty-odd feet below sea level, into which the river has flowed from time to time. It has broken in on several later occasions. It was dry at the time Imperial Valley started development in 1891. The "sea" was occasioned by the break of the Colorado River through the Alamo canal in 1905 and 1906. Drainage from Imperial Valley farms has permitted it to rise somewhat instead of evaporating completely.

Mr. CHENOWETH. The reason I referred to this 70,000 acre-feet in our project is that it is rather insignificant as compared to the amount involved in the Salton Sea.

Mr. ELY. That is a different problem. That is the effluent, the outflow from our farms. It is essential to discharge salts. It is not water wasted.

Mr. CHENOWETH. We are trying to use 70,000 acre-feet of water in Colorado and the State of California objects.

Mr. ELY. The implication is that the water is wasted and that is not correct. If the water didn't go into the Salton Sea it would go into Mexico. At some future time, the quantity going into the sea will have to be more strictly watched or policed than it is now, but it is not a waste.

Mr. CHENOWETH. I wanted to ask Mr. Matthew a question. He criticized the open canals to be used in connection with the power system.

Have you personally been over that area, Mr. Matthew?

Mr. MATTHEW. I have been through that area on several occasions, yes. I have not been over the canal.

Mr. CHENOWETH. You are not familiar with this area?

Mr. MATTHEW. I am familiar with it but I have never been over the canal.

Mr. CHENOWETH. Where the canals are to be built, do you have personal knowledge of the area and what the weather conditions are?

Mr. MATTHEW. Yes, I have been up that canyon more than once.

Mr. CHENOWETH. Which canyon are you referring to?

Mr. MATTHEW. The Arkansas River Canyon.

Mr. CHENOWETH. You have been up and down the Arkansas River?

Mr. MATTHEW. That is right.

Mr. CHENOWETH. Up into Twin Lakes?

Mr. MATTHEW. No.

Mr. CHENOWETH. You are familiar with that general area?

Mr. MATTHEW. I have not been to Twin Lakes, no, but I have been up the highway, up that canyon to Leadville, and so on.

Mr. CHENOWETH. You have been up the main highway?

Mr. MATTHEW. That is right.

Mr. CHENOWETH. You haven't been to Twin Lakes?

Mr. MATTHEW. No.

Mr. CHENOWETH. You are not, then, familiar with the valley where these canals will be built?

Mr. MATTHEW. I am generally familiar with it. You can see it from the road. I have been through there on the railroad, too. You can see the topography of the situation.

Mr. CHENOWETH. You have heard the witness testify that the canals will satisfy that situation and will carry the water as provided for in the project.

Do you dispute that?

Mr. MATTHEW. Yes. In my opinion, it is going to be impractical to operate that canal in the wintertime with an open canal.

Mr. CHENOWETH. These reports have been checked by independent engineers and they confirmed these figures and these facts.

Mr. MATTHEW. On that, I have no information. I have not seen any reference to that.

Mr. CHENOWETH. You made some reference to the Big Thompson project.

Mr. MATTHEW. That is right.

Mr. CHENOWETH. You mentioned in your statement that the Bureau of Reclamation changed from the canals to the conduits.

Mr. MATTHEW. That is right.

Mr. CHENOWETH. Do you know of personal knowledge that that is what actually happened?

Mr. MATTHEW. I can refer you to the record where the Bureau of Reclamation states it themselves. Also, I can refer you to the record where Mr. Tipton, 2 years ago testified before the Senate committee to that effect.

Mr. CHENOWETH. You have heard testimony this week that that change was made because of the economic situation, that it was cheaper to have the conduits.

Mr. MATTHEW. I will have to refer you to the record, then.

Mr. CHENOWETH. I just wanted to keep the record straight.

Mr. MATTHEW. I am sure you do and I will tell you that in the, I think it is the third supplemental appropriation for Interior in the 80th Congress, there is a complete statement made by the Bureau as to the reasons for the difference in the cost estimates between the original $43 million and what it was then in 1948. It is very clear in there. Then, Mr. Tipton, who I think everybody recognizes as a very able engineer, testified very definitely in regard to that 2 years ago before the Senate committee.

Mr. HOSMER. Will the gentleman yield?

Mr. CHENOWETH. Yes.

Mr. HOSMER. I have the document in my office and will send it over, if you want it.

Mr. CHENOWETH. I appreciate that, Mr. Hosmer.

I had the definite impression that this change was made not because the canal wouldn't carry the water, but because it was found perhaps more practical and cheaper to do it the other way. I got that impression from the testimony.

Mr. MATTHEW. I see.

Both Mr. Tipton and the Bureau of Reclamation and the statement they filed with the committee in 1948 were to the effect that the change was made largely because of the impracticality of operating open canals under winter conditions.

The winter conditions here in this area, in the Arkansas, have higher elevations, even, than on the Colorado-Big Thompson.

Mr. CHENOWETH. There is a difference of opinion on that, Mr. Matthew, and that is why I asked if you had been over this territory personally and had seen for yourself what the situation was in this immediate area.

Mr. MATTHEW. I have seen the weather conditions and I am also very familiar with weather conditions and operating canals in California in the Sierra Nevada Mountains. I know something of the operating difficulties in the winter time.

Mr. CHENOWETH. The testimony of other witnesses dispute your contention that it can't be done. They say it can be done.

Mr. MATTHEW. I think, Mr. Chenoweth, that that is a question that might well be referred to an impartial board of engineers, because it is a very expensive proposition.

The Secretary of the Interior has reported that if the conduit had to be covered, and he says tunnels would not be practical, it would cost $64 million more. Now, that is a big expense.

Mr. CHENOWETH. It is not contemplated to cover them.

Mr. MATTHEW. I know it is not, but it is contemplated to operate that canal 12 months of the year, and as I say, I do not think that would be practicable.

Mr. CHENOWETH. Well, as I say, there is a difference of opinion.

Now, Mr. Matthew, you made a very exhaustive and somewhat critical analysis of this project and have gone into some detail. You question the economics and feasibility, and the ability of the irrigators to pay for this water.

You heard the farmers who testified here this week, Mr. Cooper, Mr. Ryan, state that $5.40 per acre-foot is pretty cheap water, when that water means a crop or no crop at all.

You have heard that testimony.

Do you have any doubt at all in your mind that they can not pay that amount?

Mr. MATTHEW. Yes, I have very serious doubt and the Department of Agriculture had serious doubt about it, too, when they commented on the report in 1951.

For instance, in the Central Valley in California, the price of water there is $3.50 per acre-foot for firm water, and there you have anywhere from 7 to 9 months' growing season. They think even that price out there is a little bit high.

Mr. CHENOWETH. You heard the banker from Colorado testify this week that he would loan I think up to $25 an acre to his clients if they needed that money to purchase additional water?

Mr. MATTHEW. Yes.

Mr. CHENOWETH. You have heard the reports of the need for this extra water.

Are you familiar with the Arkansas Valley where these crops are grown?

Mr. MATTHEW. I am generally familiar, not in detail.

Mr. CHENOWETH. You have not been through that area, yourself?

Mr. MATTHEW. I have been through there, but I am not familiar in detail with it but only generally.

Mr. CHENOWETH. That last few inches of water can be pretty important.

Mr. MATTHEW. Well, even so, Mr. Chenoweth, my own personal opinion would be that it would be questionable over a long period of time, whether that much could be paid for the water, and as I say, the Department of Agriculture raised that question very definitely in their comments. They are experts on agriculture. It is just a question of whether they can or not.

I might point out to you that—take the original Bureau report, which is in House Document 187—they found after an exhaustive investigation for several years that the most the irrigators could pay was something like $3 per acre-foot and a little bit more for the water. The $3 did not pan out very well for necessary revenue, so the next year in the Secretary's revised report, it was raised to $5.40. The irrigators came before this committee and said yes, they would be willing to pay for it, but I think it is very questionable.

Mr. CHENOWETH. Is it not true, Mr. Matthews, that there is nothing unusual about this project? Is this not a typical reclamation project? A multiple-purpose project?

You have been very critical in your analysis. You have gone into extraordinary detail in dissecting the different components of the project and reflected very unfavorably on many of them.

Is there anything different about this project from what you have in California?

Mr. MATTHEW. It is all a matter of degree, Mr. Chairman.

Mr. CHENOWETH. You do not want to come up to Colorado, do you, and stop our development of reclamation and prevent our enjoying the use of our water there? I am sure you do not have that intention?

Mr. MATTHEW. I might enjoy very much coming up there and staying.

Mr. CHENOWETH. We would like to have you.

Mr. MATTHEW. The analysis is an objective engineering analysis of the project. As far as the material presented in my statement today is concerned, I merely carried out the suggestions that have been made by the Department of Agriculture and the Bureau of the Budget, to see what this thing looks like.

Mr. CHENOWETH. You were in support of the project 2 years ago, were you not?

Mr. MATTHEW. No, sir. We did not object to the authorization of the project 2 years ago.

Mr. CHENOWETH. You were not quite so critical then as now.

Mr. MATTHEW. That is very true.

Mr. CHENOWETH. What caused your change in attitude?

Mr. MATTHEW. I think that has been thoroughly explained by Mr. Ely.

Mr. CHENOWETH. I mean about the engineering part, the feasibility and economics of the project.

Mr. MATTHEW. Well, I will say this, Mr. Chenoweth, that, of course, the details of the project have been changed quite a lot since that time.

Mr. CHENOWETH. Is it a better project, today, than it was 2 years ago?

Mr. MATTHEW. I do not believe so.

Mr. ASPINALL. May the Chair interject for just a moment: It is the Chair's wish that we get away as near to 4 o'clock as we can.

The gentleman from California, Mr. Utt, has not questioned yet.

Mr. CHENOWETH. I will give him adequate time, Mr. Chairman.

Mr. MATTHEW. The Colorado River Board submitted comments directly which were made a part of the comments of the State of California and submitted them to the Secretary of Interior at the same time, and the Colorado River Board in their comments stated in part as follows: (H. Doc. 187, 83d Cong., p. 156).

> 4. The financial plan of the project depends upon the use of the interest component of power and municipal revenues to pay a major portion of the irrigation construction costs. Such use of the interest component is based upon an opinion of the Solicitor of the Department of the Interior in 1944, which has not been approved by the Congress and is believed to be contrary to law. It is also in conflict with the report of the President's Water Resources Policy Commission submitted to the President in December 1950. The report of the Commission is likely to receive consideration during the current Congress.
>
> As respects the use of the interest component, term of repayment, and other matters of general policy, Congress should first reach its conclusions upon the report of the President's Commission, and then apply them in the authorization of such a project as the one under review. For a statement of California's position on this subject, reference is made to the views of the State of California on elements of a national water resources policy submitted to the President's Water Resources Policy Commission, dated June 1950.

These comments applied to the Bureau's 1951 repoort.

Mr. CHENOWETH. The interest component is not in here.

Mr. MATTHEW. We did call attention to some questionable features of the financial aspects of the project in 1951.

Mr. CHENOWETH. I am not familiar with your California situation but I understand the Imperial district received some water at no cost, is that right?

Mr. MATTHEW. Imperial made an appropriation of Colorado River water back in the 1890's. The development was carried out under private financing, about 1900, and water was brought into the Imperial Valley in 1901. Their appropriation dates back to the natural flow of the river in the 1890's, for 10,000 second-feet. Under the Colorado River compact, that right is thoroughly protected and so, under the Boulder Canyon Project Act, Imperial merely got stored water to replace water taken away from them out of the natural flow of the stream by junior upstream appropriators.

Mr. CHENOWETH. You use power to help pay for the cost, don't you?

Mr. MATTHEW. Yes.

Mr. ELY. Under section 1 of the Boulder Canyon Project Act, it was directed that the cost of the All-American Canal should be repaid by the irrigators and by such power development as they might install on the canal at their own expense. It was also directed that no part of the power revenues of the Hoover Dam shall be used to pay the cost of the All-American Canal. The financing of the two was separated. By the same token, the All-American Canal users do not pay for any of the cost of the Hoover Dam, in consequence of that same separation, and the statute directs that no charge shall be made for the storage or delivery of water to Imperial or Coachella Valleys, for the reason Mr. Matthew stated. It is a substitute for an old appropriated rights in the natural flow.

The point I am now making is that the Hoover power revenues do not subsidize the All-American Canal. The only power revenues the users of the canal get the benefit of are the revenues of the powerplant built upon the canal at their own expense with the proceeds of bond money obligating their own properties.

Mr. CHENOWETH. Does not the sale of power purchased at the Hoover Dam pay for these lines.

Mr. ELY. Yes.

Mr. CHENOWETH. Do not they sell this power at a profit which amortizes those lines? To that extent, the Hoover Dam is subsidizing this operation, is that not true?

Mr. ELY. The All-American Canal, Mr. Chenoweth, and the Hoover Dam, are separated completely as to their revenues.

Mr. CHENOWETH. Those who purchase power from the Hoover Dam, do they not make a profit on that operation, and aren't they using the profit to amortize the cost of the line?

Mr. ELY. To subsidize the All-American Canal?

Mr. CHENOWETH. No, I mean the powerlines?

Mr. ELY. Ninety-one percent of the firm power at Hoover Dam is taken by public agencies. There is no profit in the sense of dividends. The revenues amortize the cost of the lines, repay the United States and provide for betterments to the system, and so on.

Mr. CHENOWETH. Mr. Chairman, I have a number of other questions. I appreciate your courtesies and I know that you want to close this hearing.

My colleague, Mr. Utt, has some questions, so I will close now.

I want to thank Mr. Ely and Mr. Matthew for their answers to my questions.

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Utt.

Mr. UTT. Mr. Chairman, I will not impose upon the time of the committee, but I think that the record is not complete or completely clear with regard to the flow of the water into the Gulf of Mexico. There is some confusion between the Gulf of Mexico and the Salton Sea. The water flowing into the Salton Sea is simply the drainage water from the irrigation in the Imperial Valley, which if it were on the river, would be a return flow to the river and it is about the same water that we lose in the Pacific Ocean by reason of our sewers—our joint out-fall sewers—from the water of the Colorado River.

Coming back to the 80 million feet that has been referred to in the last 20 years, that flows in the Gulf of California, they have been careful in their testimony not to bring that figure up to date, and I would like to ask Mr. Matthew some questions regarding that.

Now, the rainfall and the snow pack is complete for 1955, and there will be no waste water into the Gulf of California, by reason of floods this year?

Mr. MATTHEW. There should be very, very little this year. As a matter of fact, there hasn't been any waste water into the gulf by floods passing Hoover Dam. The fact of the matter is that ever since Hoover Dam went into operation, which was about 1935, and fortunately we had some pretty good years of runoff, so that the reservoir filled up by about 1941—it filled to a point where they could operate the spillways, and they did operate the spillways because they wanted to find out how they operated and if there were any difficulties with them. Actually, they didn't have to waste any water that year. It could have been all held. So, as a matter of fact, the way the streamflow has come ever since Hoover went into operation, there would need not have been any waste of water due to floods.

Now, the releases from Hoover have been predicated in part, and ultimately will be entirely controlled by the amount of water required for domestic and irrigation users, and the Mexican Treaty—in these past years it has been predicated upon taking care of those requirements first and then for generating power with the water that is available. The outflow from Hoover has ranged from around six to fifteen million acre-feet a year.

During that time, after the Mexican Treaty went into operation—Mexico has been using a million and a half acre-feet, or more a year. But the net amount of water going into the Gulf of California—and I don't have the figures with me—if it were 80 million acre-feet in 20 years, that would be 4 million acre-feet a year on the average, and it is possible that the figures would show that.

I would be glad to get the figures available and submit them for the record.

(The following was submitted for the record:)

Available information relating to the flow of the Colorado River into the Gulf of California is as follows:

There are and never have been any measurements or records of the flow of the Colorado River into the Gulf of California. However, measurements have been and are still being made from which can be obtained a close approximation of the flow of the Colorado River into Mexico. These compiled figures of the flow

into Mexico from 1935 (the year that Hoover Dam went into operation) to and including 1954, are as follows:

Flow into Mexico

[Millions of acre-feet annually]

1935	2.7	1940	3.9	1945	8.2	1950	6.0
1936	1.8	1941	11.5	1946	6.0	1951	3.8
1937	2.0	1942	11.7	1947	6.6	1952	10.3
1938	2.1	1943	8.5	1948	8.5	1953	5.4
1939	4.9	1944	10.3	1949	8.0	1954	4.5

The flow into the Gulf of California would be substantially less than the foregoing indicated flow into Mexico, by the amount of water consumed in Mexico for irrigation and other purposes and by natural losses, which amount has not been estimated but would probably be 2 million acre-feet or more.

Mr. MATTHEW. Lately, I want to say, the controlled flow has been gradually reduced so that the flow at the border has been down to around 4 million acre-feet a year and much less into the Gulf of California. This coming year, with a 30 percent reduction in firm power output at Hoover, which has been announced in the paper, there probably will be no more water reaching the Mexican border—at least, I presume the attempt will be made for no more water to reach the Mexican border than required by the Mexican Treaty. I doubt that there will be any so-called waste into the Gulf of California this coming year.

Mr. UTT. What is the present deficiency in acre-feet, in Lake Mead.

Mr. MATTHEW. Lake Mead is down to an active storage of around 11 million acre-feet.

The full active storage capacity is 29 million acre-feet.

Mr. UTT. It is down 18 million acre-feet?

Mr. MATTHEW. Yes.

Mr. UTT. How much is Lake Mohave, do you know?

Mr. MATTHEW. Lake Mohave does not loom very large in the storage. It fluctuates up and down. In fact, it is operated mainly for re-regulating releases from Hoover.

Mr. UTT. It is fed entirely from Hoover?

Mr. MATTHEW. That is right.

Mr. UTT. And Lake Havasu?

Mr. MATTHEW. Lake Havasu has a variation of 3 or 4 feet at different times of the year, and that is all. They vary the level to that extent. The useful storage is small.

Mr. UTT. This 80 million feet that has been referred to so many times occurred when the All-American Canal was not in full operation and when the Metropolitan aqueduct was in partial operation and several other diversions, and since those diversions are almost all in full operation, with the exception of Metropolitan, there will not be that constant flow below the Mexican border.

Mr. RHODES. Mr. Chairman, might I ask one further question before we go. I just wanted to clear up one point in the testimony.

Mr. Ely, you mentioned that according to your theory, the beneficial consumptive use of water occurred when water was stored for power, or for control of the river?

Mr. ELY. No, Mr. Rhodes, I think you suggested that as one possibility. That is not our interpretation. That is an interpretation advocated by the proponents of the depletion theory.

The people who believe that say that the use occurs when the water is put into storage and not when it is taken out. We say that the consumptive use occurs when the water is taken out of storage and applied to the land or otherwise in fact burned up or consumed.

Mr. RHODES. If you will recall, I asked you that question in an effort to justify your previous statement that the use of water contemplated by the upper Colorado storage project, coupled with Fryingpan-Arkansas, made this a dangerous project.

Now, I am at a loss to know how there could be enough use from the upper Colorado project and this project, to make the two of them dangerous, as far as the water is concerned.

Mr. ELY. We misunderstood each other.

Mr. RHODES. Would you care to further clarify that?

Mr. ELY. The Colorado River storage project troubles us for two basic reasons, one with respect to the operation of their great storage reservoirs, the other with respect to the actual consumptive use by the so-called participating projects and those that are foreshadowed in the future.

Mr. RHODES. Do you mean so much water would be held back by the filling of these reservoirs that there might not be sufficient water for the uses in the lower basins?

Mr. ELY. Yes, the rate at which the water is accumulated and the terms under which it is released.

Mr. RHODES. And now, No. 2?

Mr. ELY. Second, consumptive use, in the sense of burning up water, by the participating projects proposed in S. 500 and H. R. 412, by the reservoir losses, and by the implication of much greater transmountain diversion and other uses to follow.

The first impact we will feel will be the operation of storage reservoirs. The day that Glen Canyon gates are closed, the in-flow at Lake Mead will be curtailed. How much, we have been unable to get from anyone. We have been unable to get any satisfactory assurance in that respect.

We have asked of the Bureau of Reclamation a table showing how they would operate Glen Canyon Reservoir, assuming it was completed in a year like 1931, followed by years duplicating those from 1931 down to date. At what rate would they accumulate water and at what rate would they release it to the lower basin.

That is vital, and we have to know that.

Second, after the reservoirs are filled, how are they going to operate them to preserve the power head at Glen Canyon or the power head at Lake Mead, to give us our water in a steady rate of discharge, or in highly fluctuating stages.

That is the impact of the reservoirs. That is the first thing we feel and that will persist for perhaps twenty odd years. That was the figure used last year by the Bureau for the filling period. This year they say perhaps 5 or 6 years.

The long-range problem is the effect of the upper basin consumptive uses.

They contemplate, apparently, according to Bureau figures, putting their whole apportionment to use in 50 years or less. Perhaps very much less. I have seen figures as low as 25.

When that time comes, how much are they going to withhold from us, and burn up in the upper basin? Is it going to be a maximum of 7½ million acre-feet in any one year, or is it going to be an average of 7½ million, meaning they can hold back and use 9½ or 10 in one year, if they have used 4½ or 5 in another?

It is not merely the projects named in S. 500 that occasion that long-range danger.

Mr. ASPINALL. S. 500 is not directly before this committee.

Mr. ELY. I realize that. However, the question related to the Colorado storage project and S. 500, I thought, was before the committee.

Mr. ASPINALL. This present bill does not have as many projects as those in the bill to which you refer.

Mr. ELY. In any event, the Colorado River storage project, by one name or the other, foreshadows the use in the upper basin of the total apportioned to it.

S. 500 says, "Referred to the Committee on Interior and Insular Affairs in the House of Representatives," so I thought you had it.

Mr. ASPINALL. Well, the gentleman is partially right, because all the bills are before the committee.

Mr. ELY. Have I answered your question, Mr. Rhodes?

Mr. RHODES. You have, thank you.

Mr. ASPINALL. Thank you, very much, Mr. Ely and Mr. Matthew for your appearance before the committee.

Mr. MATTHEW. Thank you, Mr. Chairman.

Mr. ELY. Thank you, Mr. Chairman. I have here a resolution passed by the Arizona State CIO Political and Legislative Committee, at Phoenix, Ariz., and I would like to have it appear in the record.

Mr. ASPINALL. Without objection, the document will appear in the record at this point, and the committee will adjourn.

(Whereupon, at 4:05 o'clock p. m., the subcommittee adjourned to reconvene at the call of the chairman.)

(The document referred to follows:)

RESOLUTION ON COLORADO RIVER WATERS

Whereas the House of Representatives of the 22d Arizona Legislature on April 2, 1955, unanimously adopted the following motion:

"It is the sense of the House that we oppose construction of any projects to export additional Colorado River waters out of the river basin, or to take from Arizona the power revenues to be produced at dams located within the boundaries of this State, as being contrary to recognized principles of water law, and to the rights and interests of the people of Arizona."

Whereas there is now pending in the United States Supreme Court a law suit between the States of Arizona and California with respect to the waters of the Colorado River, and

Whereas the winning of this law suit and the securing of the water of the Colorado River is absolutely essential to the welfare and economic well being of the working people of this great State, and

Whereas, this body understands that California has pledged every right that it may have to the water of the Colorado River and that Arizona has failed to include in its pleadings those allegations concerned with the water filings on the Colorado River known commonly as the Colter water filings; Now, therefore, be it

Resolved by the Arizona State CIO Political and Legislative Committee, That the Governor of the State of Arizona, the attorney general, the interstate stream commission, and the congressional delegation of this State, be informed that our membership feels that they should utilize every possible method to obtain a victory in this law suit and amend our pleadings to include every claim that the State of Arizona may have to the water of the Colorado River.

FRYINGPAN-ARKANSAS PROJECT, COLORADO

FRIDAY, JULY 1, 1955

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION OF THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D. C.

The subcommittee met, pursuant to recess, at 9:45 a. m., in the committee room, New House Office Building, Hon. Wayne N. Aspinall (chairman of the subcommittee) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will be in session for the further consideration of H. R. 412.

The witnesses that have been asked to be present this morning are witnesses from the Bureau. Mr. Dexheimer is detained unavoidably, so I understand, for a few minutes, but he will be here.

So if Mr. Tomlinson, Assistant Director, Project Development Division of the Bureau; Mr. Ben Powell, representative of the Pueblo reclamation office; and Mr. Lindseth, assistant regional director, region 7, will take their places before the witness table.

The first thing I am going to ask of the witnesses this morning will be a request to bring us up to date with a little statement of 4 or 5 minutes to reorient the committee with that which is involved in the project.

STATEMENT OF W. A. DEXHEIMER, COMMISSIONER OF RECLAMATION; ACCOMPANIED BY GEORGE TOMLINSON, ASSISTANT DIRECTOR, PROJECT DEVELOPMENT DIVISION, BUREAU OF RECLAMATION; BEN POWELL, PUEBLO RECLAMATION OFFICE; AND EMIL LINDSETH, ASSISTANT REGIONAL DIRECTOR, REGION 7, DENVER, BUREAU OF RECLAMATION—Resumed

Mr. TOMLINSON. Mr. Chairman, as you know, previously we have filed and made a very detailed statement, and I will highlight very briefly what this project is.

It is a project to supply needed water to the Arkansas River Valley by collection and reregulation of the winter flood flows in the Arkansas Valley and by importing from the west slope of the Continental Divide approximately 69,000 acre-feet of water per year through the proposed project tunnel. It will also make practicable the bringing through an existing tunnel an additional amount of about 15,000 acre-feet per year, to which the present water right owners have a decreed right.

The west slope water, when it is brought over, will be run through some storage reservoirs on the eastern slope, beginning, as you see on

the map, with the very high Sugar Loaf Reservoir, which will be greatly enlarged from 17,000 acre-feet to 117,000 acre-feet. It is a privately owned reservoir, but the necessary rights will be acquired and it will become a Federal reservoir.

Mr. ASPINALL. So as to bring it to the minds of the committee members, the Sugar Loaf Reservoir is located how far from the town of Leadville?

Mr. TOMLINSON. About 6 miles, I would say. Something on that order—5 or 6 miles.

It is presently owned by the Colorado Fuel & Iron Corp. It is a small 17,000 acre-foot reservoir. It will be acquired by the project and enlarged to 117,000 acre-feet.

The water then will be run through the canal down through the Twin Lakes Reservoir, which is at present another privately owned reservoir, with a capacity of 56,000 acre-feet. That reservoir will be acquired by the project and will be enlarged to 260,000 acre-feet.

The water will then be released through a series of canals and powerplants down through the project reservoir just above Pueblo. That will be a rather large 400,000 acre-foot reservoir and will be the final regulating reservoir for the project.

Coming down from Sugar Loaf, there will be a series of powerplants at Elbert, Otero, Wapaco, Princeton, Pancho, and Salida, and also one at Pueblo Dam.

Dr. MILLER. How much power will those plants generate annually?

Mr. TOMLINSON. Annually, a little over half a billion kilowatthours.

Dr. MILLER. Half a billion?

Mr. TOMLINSON. 505 million I believe, is the exact figure, and there will be an installed capacity of around 104,000 or 105,000 kilowatts.

The water from the project reservoirs will then be used to supply both domestic and irrigation, and it will be available to approximately 322,000 acres of land now irrigated.

Dr. MILLER. How much water would be available to the 322,000 acres?

Mr. TOMLINSON. Approximately 185,000 acre-feet per year.

Dr. MILLER. About a half an acre-foot to each acre?

Mr. TOMLINSON. Fifty-eight one-hundredths, I think, is the figure per acre-foot. That will not necessarily be available every year. That is the average figure. Sometimes it may be a foot or more. Sometimes it may be less.

Dr. MILLER. How much water do they get without this additional water? How much do they get now?

Mr. TOMLINSON. It is in the order of 3 feet. I think it is a little under 3 feet.

Dr. MILLER. And the crops they raise require additional water?

Mr. TOMLINSON. They require additional water. They have at present a shortage of around 34 percent on the average. The project water we are talking about will reduce that shortage about in half. It will be 15 or 17 percent, which as you know——

Dr. MILLER. Do they add any new acres?

Mr. TOMLINSON. As far as I know, there will not be a single acre added.

Dr. MILLER. Do they help out any class 4 land presently irrigated?

Mr. TOMLINSON. As I recall, it is all class 1 and 2 land. There is a little bit of class 6 land, 13,000 acres of class 6 land. Generally it is so interspersed that, as a practical matter, it has to be irrigated. It is not a 13,000-acre block; it is an acre here and 5 acres there, which you could not very well dike off and not irrigate.

Dr. MILLER. Now for the industrial and domestic water supply's place in this.

Mr. TOMLINSON. The plans are to sell 20,500 acre-feet of water. This will be broken down roughly, as I recall it—I am speaking from memory now—about 10,000 acre-feet to Colorado Springs——

Dr. MILLER. Do you know what that amounts to per thousand gallons?

Mr. TOMLINSON. The cost?

Dr. MILLER. Of the water these folks in the towns get for domestic and industrial uses.

Mr. TOMLINSON. An acre-foot is around a third of a million gallons—0.325 million gallons. So the 10 million would be about——

Dr. MILLER. I would like to know about how much that figures per thousand gallons of water.

Mr. TOMLINSON. We will have it in just 1 minute. About 3.2 billion gallons per year.

Dr. MILLER. How much will the city pay for each thousand gallons of water?

Mr. TOMLINSON. About 23 cents a thousand gallons, sir.

Dr. MILLER. We have a bill before us which you folks reported on the Washita project.

Mr. TOMLINSON. Yes.

Dr. MILLER. And the people down there think they ought not to pay more than 11 cents. I think in the final agreement they have settled on 14 cents per thousand gallon. Here they would pay about 23 cents.

Mr. TOMLINSON. Yes.

Dr. MILLER. Can they afford to do that?

Mr. TOMLINSON. They have so testified. As a matter of fact, they are anxious to get into the district. Both of the cities of Pueblo and Colorado Springs have passed ordinances which would place them in the conservation district and would place them not only in a position to pay for the water but also to place their assessed valuation on the rolls of the conservation district.

Mr. HOSMER. Will the gentleman yield?

Dr. MILLER. The thing that bothers me here is how your Department can sit down with one group on the Washita project and want 17 cents per thousand gallons, said that was all they could afford to pay, but you come in here with another one amounting to 23 cents per thousand gallons and the folks are very anxious to get it at that price. I just wondered what formula you used for the two different sections for the price of the water. Can you straighten me out on that?

Mr. TOMLINSON. All I can say on that, sir, is we made an allocation of costs to the different purposes—irrigation, power, and municipal water—and the municipal water allocation came to so much. And because the 2 large cities and the counties in which those 2 cities are located wanted to come into the conservation district, and would par-

ticipate in the conservation taxes to the extent of about two-thirds of the total taxes, we made a small allotment of the taxes to assist in the municipal water, something like, as I recall it, 25 percent, or 27 percent.

Mr. ASPINALL. If my colleague will yield. I think the answer to that is that to the cities in Colorado this amount is going to be a very small portion of the whole, and they can afford to pay the additional costs as far as the overall costs to the consumer is concerned. While down in Oklahoma the water they will get is rather an appreciable amount, and they cannot afford to blend it in with what they are getting with the wells and so forth to raise the cost to the consumers. Is that correct?

Mr. TOMLINSON. That is certainly correct. The figure, which Mr. Powell just gave me, of 23 cents a thousand gallons, together with the proportion of the conservancy tax which will be applied to municipal water, would retire the entire municipal water allocation in 50 years with interest.

Mr. HOSMER. Will the gentleman yield?

Dr. MILLER. Yes; I yield.

Mr. HOSMER. What is that 23 cents per thousand gallons translated into acre-feet—price per acre-foot?

Mr. TOMLINSON. It varies. It is an average figure. The cost for water——

Mr. HOSMER. What is the average price per acre-foot?

Mr. TOMLINSON. The cost for water is $5.40 at the river or the reservoir, plus the distribution works. By distribution works, we do not mean within the city, but to the city limits, which in the case of Colorado Springs would be approximately a 50-mile conduit, and in the case of the lower cities would be about——

Mr. HOSMER. The Government is putting that in for $15 million, or something like that?

Mr. TOMLINSON. Yes, sir; something like that.

Mr. HOSMER. Would you have any figure then? You are going to provide it with the conduits.

Mr. TOMLINSON. Yes, sir. It is priced now with the conduits in. but we have it in two steps so you can figure either way.

Mr. HOSMER. We have got $5.40.

Mr. TOMLINSON. $5.40 at the reservoir or river, and then the pipelines would cost in the case of Colorado Springs about $52.50 per acre-foot, and in the case of the valley towns would be $68.20 per acre-foot. That is in addition to the $5.40.

Mr. HOSMER. So they will be paying a total in the case of the valley around $73 per acre-foot?

Mr. TOMLINSON. That is right.

Mr. HOSMER. Relate that back to your 23-cents-a-gallon figure, Is that an average between the valley towns and Colorado Springs?

Mr. TOMLINSON. Yes, sir. Mr. Powell says an overall average.

Mr. HOSMER. What is the maximum and minimum, Mr. Powell, for the valley towns in the area?

Mr. POWELL. In thousand gallons. Out of memory it runs between $52 and $68.

Mr. HOSMER. In relation to the thousand gallons?

Mr. POWELL. In thousand gallons. Out of memory it runs between about $25 and $21.

Dr. MILLER. I have one more question, Mr. Tomlinson. I notice flood control is $20,341,000, and Fish and Wildlife is $2,830,000.

Mr. TOMLINSON. That is right.

Dr. MILLER. They are nonreimbursable?

Mr. TOMLINSON. That is right.

Dr. MILLER. Those are the two items, which amount to $23 million out of the $172 million which will be nonreimbursable?

Mr. TOMLINSON. Yes, sir.

Dr. MILLER. And the rest will be paid back?

Mr. TOMLINSON. Every bit of the rest would be paid back. The figures you read are from the 1953 report. The current revision shows an even higher percentage of reimbursables. The municipal and power would be paid back with interest, and the irrigation would be paid back without interest from three different sources: (1) The $5.40 per year which would be paid on the yearly basis as they use the water; (2) the conservancy district tax, which would start out with a figure, as I recall it, of around $405,000 per year and would increase about $7,000 per year; and (3) after the power had paid out—and it would pay out in the 39th year after construction—power would contribute for the 11 additional years to help pay out.

Dr. MILLER. At the rate of 6 or 5½ mills?

Mr. TOMLINSON. Six mills for firm power.

Dr. MILLER. Can you sell it all for firm power?

Mr. TOMLINSON. We think we can. The competitive rate or alternate rate would be 7.7 mills with privately developed power. To be perfectly frank with you, that rate has a 1.3 mill tax component, but if you took that out the competitive rate would still be in the order of 6½ mills.

Dr. MILLER. Will anything be paid in lieu of taxes on these powerplants?

Mr. TOMLINSON. No, sir; there is nothing planned in the way of in lieu of tax payments.

Dr. MILLER. I think that is all, Mr. Chairman.

Mr. ASPINALL. Does the gentleman from Oklahoma have any questions?

Mr. EDMONDSON. No questions at this time.

Mr. ASPINALL. The gentleman from Pennsylvania, Mr. Saylor, is recognized. I wish that his first request would have to do with placing in the record the questions and answers which I hand to him at this time.

Mr. SAYLOR. Mr. Chairman, in the 83d Congress when this bill was up I submitted a series of questions to the Department of the Interior, and after the bill had been reported out of our committee and attempted to be brought to the floor of the House, I received these answers from the Department of the Interior. Now I do not agree with all of them, as I indicated in the letter which I wrote to the Bureau. Some of them I agree with. But I think that the Bureau of Reclamation did an excellent piece of work in answering these questions. I think for the information of the members of the committee and the Members of Congress that these questions and answers should be made a part of the hearing, and I make the unanimous-consent request, Mr. Chairman, that the questions and answers that I received from the Bureau be made a part of the record in these hearings.

Mr. ASPINALL. The Chair has examined the document referred to and he thinks the request of the gentleman is in order and very timely at this place in the hearing. Is there any objection?

Hearing no objection, it is so ordered.

(The document referred to follows:)

REPLY TO QUESTIONNAIRE FROM JOHN P. SAYLOR, MEMBER OF CONGRESS, TO SECRETARY OF THE INTERIOR RE H. R. 236, FRYINGPAN-ARKANSAS PROJECT OF COLORADO (JANUARY 1954)

This statement has been prepared to answer the questionnaire which accompanied the letter dated November 10, 1953 from Hon. John P. Saylor, Member of Congress, to the Secretary of the Interior.

For convenience, each question from the questionnaire is stated in the ensuing text, followed by the answer. Large statistical tables are bound in the back in numerical sequence rather than being interleaved in the text. Every attempt has been made to answer each question as completely as possible in the time available. Where doubt existed as to the scope or meaning of a question, at least one interpretation or assumption is stated and answered.

The questionnaire refers to estimates and data set forth in the project planning report. Cost estimates and financial and economic analyses in the report of January 1950 were revised by Secretary McKay's report to the President dated April 30, 1953. Current cost estimates and other requested analyses are compared with corresponding data in the Secretary's report rather than with data in the original report. Both reports are contained in House Document 187, 83d Congress, 1st session. That document will be cited subsequently only as House Document 187.

1. Question. Furnish tabulations of estimated construction costs and annual costs, itemized by units or features, comparing estimates as set forth in project planning report and revised estimates at current price.

Answer. The estimated total project construction cost based on October 1953 prices is $177,432,000 as compared to $172,898,000 for January 1953 prices. The increase of $4,534,000 is 2.6 percent of the January 1953 costs. Annual operation, maintenance, and replacement costs for the January 1953 analysis were estimated on a long-range projected price level, consequently, the effect of the change in price index between January and October 1953 would be negligible when applied to annual costs. The accompanying table 1 presents an itemized list, comparing construction costs of individual features showing January and October 1953 prices and annual costs based on long-range projected prices. The January 1953 costs in table 1 correspond to costs shown in table IV, page 7, House Document 187.

2. Question. Furnish tabulations showing allocations of costs, capital and annual, by major functions in total and by individual units or features, with comparative figures based on estimates set forth in project planning report and on revised estimates at current prices.

Answer. Comparative allocations of construction costs are summarized below:

Purpose	Price level	
	October 1953	January 1953
Municipal water	$33,129,000	$32,654,000
Irrigation	78,272,000	75,128,000
Power	42,043,000	41,945,000
Flood control	21,112,000	20,341,000
Fish and wildlife	2,876,000	2,830,000
Total	177,432,000	172,898,000

Details of the preceding allocation are shown in table 2 through 4A. Table 2, which is identical to table II, page 6, House Document 187, shows the segregation of construction costs at January 1953 price levels, and operation, maintenance, and replacement expenses on projected price levels. Table 2A shows the segregation of costs at October 1953 price levels. Table 3 presents the cost allocation with January 1953 prices shown in table III, page 7, House Document 187. Table

3A presents the cost allocation using October 1953 prices. Table 4 shows the allocation of costs for individual features using January 1953 prices for construction. Table 4A presents a similar allocation of construction costs at October 1953 price levels.

3. Question. Furnish a detailed financial analysis of the proposed repayment program, showing for each year of the repayment period: (*a*) Fixed and operating costs, separately and in total; (*b*) revenues and sources of revenues, including proposed rates for water and power (gross and net revenues after defraying fixed and operating costs) and their application to repayment of reimbursable costs.

Answer. The financial analysis of the proposed repayment program as requested by paragraph 3 of the questionnaire has been prepared on the basis of October 1953 construction costs. This table is comparable with table V in the Secretary's report, page 8, House Document 187.

A detailed analysis of the project repayment is presented in table 5, financial study No. 1. This analysis shows that the reimbursable project costs can be repaid over a period of 71 years.

The power investment of $43,355,000 including interest during construction can be repaid, with interest at 2½ percent on the unpaid balance, in a period of 44 years after a 9-year development period. Following repayment of the power investment, net power revenues would be applied on the irrigation investment for 18 years, paying a total amount of $27,847,000.

The municipal water investment of $34,318,000 including interest during construction can be repaid, with interest at 2½ percent, over a period of 51 years following a 14-year development period. Following repayment of the municipal water investment, net revenues would be applied to the irrigation debt for a period of 6 years, paying a total amount of $6,885,000.

That part of the irrigation investment borne by the irrigation beneficiaries amounting to $43,540,000 would be repaid without interest in a period of 70 years.

The source and amount of annual irrigation and municipal water revenues showing the amounts of water delivered and the rate charged, are shown in tabulations at the bottom of the financial study. The gross and net annual revenue derived from the sale of electric power, the salable firm and secondary energy and rates, and the annual operation, maintenance, and replacement costs are shown in table 5A, power system average rate and repayment study No. 1–A.

4. (*a*) Question. In view of doubt expressed in project planning report as to whether municipal water supply facilities would be constructed and financed as a part of the project or would be built and financed independently by cities and towns, and the policy of the present administration favoring construction of public works by non-Federal agencies where able, what would be the effect on the financial feasibility and the financial program of the proposed project if the municipal water supply features were eliminated?

Answer. Assuming that the municipal water supply facilities costing $22,124,000 would be constructed and financed independently by the cities and towns, the total estimated construction cost of the Fryingpan-Arkansas project would be $155,308,000 based on October 1953 prices. Project water would be delivered to Pueblo and the valley towns at Pueblo Reservoir in the same amounts as envisioned in the planning report. Water to replace increased diversions by Colorado Springs and other communities would be purchased from the project. This service would share in the construction cost of the joint water supply and storage facilities. The cost of these joint facilities allocated to municipal water would be $11,485,100 including interest during construction and would be repaid by the municipal water users with interest at 2½ percent on the unpaid balance. The power, irrigation, flood control, and fish and wildlife investments would remain unchanged.

The power investment would be repaid with interest at 2½ percent in a period of 44 years following a development period of 9 years. Following repayment of the power investment net revenues would be applied on the irrigation debt for 20 years paying a total of $29,713,992. The municipal water investment of $11,485,100, would be repaid in the 62d year with interest at 2½ percent on the unpaid balance. Following repayment of municipal water investment the net revenues would be applied on the irrigation debt for 10 years, paying a total of $3,774,000. The irrigation debt borne by the irrigators, $44,784,000, would be repaid without interest in a period of 72 years.

4. (*b*) Question. What are the present prospects that the cities and towns will provide their own facilities?

Answer. It is impossible at present to determine whether or not the cities and towns of the Arkansas Valley can provide the required facilities by private financing. Factors motivating in favor of private financing are that such facilities could possibly be constructed at lower cost by private enterprise and, probably more important, the cities and towns would enjoy more freedom from Government restrictions if they are able to privately finance and construct the required facilities. On the other hand there are certain inherent legal problems pertaining to organization and financing which could be extremely difficult of solution. This question is discussed at greater length in a letter from Mr. Charles J. Beise, attorney for the Water Development Association of Southeastern Colorado. A copy of this letter is attached as exhibit A.

Attention is called to the recommendation included in the project planning report—paragraph F, page 41, House Document 187—it is recommended that "F. All or any part of the specific municipal water supply systems described in this report be constructed by the Secretary of the Interior, only after satisfactory evidence is presented to the Secretary of the Interior that it would be infeasible for the communities involved to construct or to finance the construction of such work themselves, singly or jointly."

4. (*c*) Question. Assuming elimination of municipal water supply features of project, furnish detailed information on costs and financial aspects in parallel with questions 1, 2, and 3.

Answer. The project construction costs, without the specific municipal water supply facilities, are segregated into the major project purposes in table 6. This table also shows the allocation of construction costs, annual operation, maintenance and replacement costs, and interest during construction to the several project purposes.

A detailed analysis of the project repayment is presented in table 7, financial study No. 2. This table also shows the source and amount of annual irrigation and municipal water revenues. The source and amount of power revenues are the same as shown on table 5A, power system average rate and repayment study No. 1–A.

It has been assumed that the cost of specific municipal water-supply works would be $22,124,000, even though constructed by the municipalities. No other basis for an estimate is readily available. It has also been assumed that the ultimate cost of water to the municipalities would equal the total rates of Federal construction shown in table 13. The difference in rates between tables 7 and 13 allows sufficient funds for amortization of the specific works by the municipalities at an interest rate between 2 and 2½ percent. It should be noted that all proposed rates for municipal water are approximations, subject to final determination when a definite plan is prepared.

5. Question. (*a*) Furnish a monthly operation study, for a critical period of 10 years, showing diversions of water from Colorado River Basin to Arkansas River Basin, amounts of such water used directly for power generation or stored in proposed storage reservoirs at head of Arkansas power canal for subsequent release, reservoir stages in acre-feet, amounts of water release from storage and total supply used for power generation in each of six proposed powerplants, and the amounts discharged into the Arkansas River.

(*b*) Furnish a monthly operation study, for a typical critical period of 10 years and a typical flood year, of Pueblo Reservoir and powerplant, showing total inflow and amounts thereof of Colorado River Basin water, total releases and amounts thereof used for power generation, amounts thereof for municipal water supply, reservoir stages in acre-feet capacity, effective power head, energy generated (firm and secondary) and available kilowatt capacity.

Answer. A copy of the Fryingpan-Arkansas project operation study which supported the project planning report dated January 1950 accompanies this memorandum as exhibit B. The operation study covers the 34-year period, 1911–44. A critical 10-year period, 1931–40, has been marked off on the summary sheet and critical 10-year average data entered at the bottom of the page for each column of the operation study. A typical flood year would be the water year 1921.

The Fryingpan-Arkansas project is designed as a coordinated system to accomplish the functions of a multiple-use project by importing Colorado River water and providing for better use of native Arkansas River water. The quantity of Colorado River water to be imported by the project is small. Although native Arkansas River water usable for power generation greatly exceeds the imported water, stored Colorado River water provides a water operating fund to maintain firm energy generation and peaking capability during low-flow periods of each

year. Use of native Arkansas River water only, would relegate the entire power system to a river-run status, with practically no firm energy generation and the power system would immediately become infeasible. The existing operation studies are not susceptible to a breakdown which would demonstrate potential firm energy generation by Colorado River water separate from native Arkansas River water. An erroneous picture would result from attempting such a breakdown of existing studies.

6. Question. Furnish an analysis, showing for each powerplant separately and for all combined capital and annual costs (fixed and operating) assuming fixed costs based on interest at 3 percent and at 2½ percent and 50-year amortization of capital investment, electric energy output, firm and secondary, the average production cost per kilowatt hour of salable energy, and production cost per kilowatt-hour for firm power assuming secondary energy is sold at 3½ mills per kilowatt hour.

Answer. A comparison of costs and revenues for individual powerplants would be misleading. The necessary peaking capacity is concentrated in specific plants at such points as the necessary regulatory water storage capacity is available. Powerplants which would provide peaking capacity are essential to any coordinated power system, however, such powerplants would show a lower use factor and a comparison of total power generation on an individual plant basis would not present a true picture. Although physically separated, the project powerplants will be interconnected and operated as a system. The location and capacity of the plants is the culmination of complicated studies. As an example, early studies were made of a single plant at the lower end of the system having substantially the same generating capacity as the present three lower plants. The plan for the single plant was discarded in favor of three separate plants along the power canal for reasons of economy and flexibility.

Table 8, power system average rate determination study, presents a financial analysis of the power system with October 1953 construction costs and assuming amortization of the power investment at 3 percent interest in 50 years following a 9-year development period and secondary energy sold at 3.5 mills per kilowatt-hour. The study shows that the specified repayment conditions can be met by selling firm power at a rate of 5.5 mills per kilowatt-hour. The table also shows the average annual generation and sales of the individual powerplants after the development period, also average production cost for the power system during the entire repayment period.

Table 9 presents a similar study to table 8 and assumes an interest rate of 2½ percent on the power investment and a 50-year amortization period following a 9-year development period. This study shows that the specified repayment conditions could be met.by selling firm power at 5.2 mills per kilowatt-hour and secondary energy at 3.5 mills per kilowatt-hour.

7. (*a*) Question. In view of the proposal submitted by private power companies to finance and build the necessary transmission facilities in connection with the proposed hydroelectric power development of the project, what would be the effect on the financial feasibility and financial program of the proposed project if the power-transmission facilities were eliminated from the proposed project.

Answer. In the event that private power interests would construct the transmission facilities necessary for the disposal of project power the total project-construction cost would be reduced to $171,532,000 based on October 1953 prices. The power investment would be $37,289,000 including interest during construction and could be repaid in 40 years following a 9-year development period. Power would be delivered at the high-voltage side of the powerplant switchyards and sold at the rate of 4.6 mills per kilowatt-hour for firm energy and 3.0 mills per kilowatt-hour for secondary energy. While these rates would result in revenues sufficient to amortize the power investment in 4 years less time than as shown in financial study No. 1, an additional 4 years of application of full net power revenues to the irrigation investment would be required in order to retire all reimbursable project costs in a period of 70 years. Municipal water and irrigation investments would remain unchanged and would be repaid in the same periods as shown in table 5, financial study No. 1.

7. (*b*) Question. Assuming elimination of power transmission facilities from the project, furnish detailed information on costs and financial aspects of the projects so modified, in parallel to the information requested in questions 1, 2, and 3.

Answer. The project construction costs without the power transmission facilities are segregated into the major project purposes in table 10. This table also

shows the allocation of construction costs; operation, maintenance, and replacement costs; and interest during construction to the various project purposes.

A detailed analysis of the project repayment is presented in table 11, financial study No. 3. This table also shows the source and amount of annual irrigation and municipal water revenues.

The amounts of salable energy, rates, gross and net revenues, annual operation, maintenance, and replacement costs of the power system are shown in table 12, power system average rate and repayment study No. 3–A.

8. (*a*) Question. In view of the experience on the Colorado-Big Thompson project where it was found necessary to redesign the project and substitute tunnels for originally proposed open channel power conduits, is there assurance that it will be practicable to operate the Arkansas power canal of the proposed project as an open conduit under ice and snow conditions which would prevail in winter?

Answer. Considerable study has been given to the problem of winter operation of the project power system. The conclusions drawn from these studies indicate that the assumptions as to the reliability of the system in winter is not overoptimistic. A mathematical analysis of the heat losses from the power canals and forebays indicates an anticipated heat loss from water passing through the power system of 21 B. t. u. per pound. This loss is based on an air temperature of 30° F. below zero, an initial water temperature of 39° F. (the temperature of water at maximum density such as would be drawn from the storage reservoir) and a wind velocity of 15 m. p. h. The computed heat loss represents the loss from a free water surface. The project power system has been planned and facilities provided for maintenance of a permanent ice cover during the winter months. This ice cover would materially reduce the loss of heat from the water in the canals and forebays. Studies made by Mr. J. C. Stevens (proceedings—ASCE, December 1921) show that no serious problems from frazil or anchor ice would occur if the surface ice cover is maintained.

8. (*b*) Question. Assuming it is found necessary to substitute tunnels for all or a portion of the proposed open-canal power conduits, how much would the estimated cost of the proposed project be increased?

Answer. The terrain traversed by the power conduits is such as to preclude the substitution of tunnels for the power canals. If the canals were replaced by covered conduits which would preserve the head available for power generation the total construction costs would be increased by about $64 million. Such an increase in cost would render the project infeasible.

9. Question. (*a*) What would be the cost delivered of fixed and operating expenses, separately and combined, per acre-foot of municipal water supply on the average for all services and for each individual city or town served?

(*b*) What are the annual amounts of municipal water supply estimated to be delivered in each year of the repayment period?

(*c*) What are the proposed rates for municipal water supply delivered, averaged, and for each individual city or town?

Answer. Table 13, estimated cost of municipal water, lists the communities which benefit from the municipal water function of the project, and shows the amount of water delivered annually; the type of service rendered in making delivery; the annual per acre-foot cost of operation, maintenance, and replacement; the annual per acre-foot amount applied on the capital investment, and the total annual per acre-foot charge or rate for water delivered. This table is an expression of the table on page 118 of H. Doc. 187.

9. (*d*) Question. What assurance is there that individual cities and towns will be willing and able to pay the rates required to cover cost of service?

Answer. This question is answered by the following from the Water Development Association of southeastern Colorado, dated December 14, 1953:

Mr. B. F. POWELL,
Area Engineer, Bureau of Reclamation,
Pueblo, Colo.

DEAR MR. POWELL: The following question has been referred to this association; "What assurance is there that individual cities and towns in the Arkansas Valley will be willing and able to pay the rates required to cover cost of service for domestic water under the proposed Fryingpan-Arkansas project?"

We have discussed this question with authoritative representatives of cities and towns within the past week. After examining the rates they reaffirm by statement on file the position taken by them in 1948, that they are willing and

able to pay the rates required to cover cost and service as set forth in House Document 187.

Many farmers in the valley in addition to their interest in supplementary irrigation water have requested services from the pipeline for domestic use and state they also are willing and able to pay the proposed rates.

Yours very truly,

M. G. WILLIAMSON,
Executive Secretary-Treasurer.

10. (*a*) Question. What justification is there for deferment in starting repayment of substantial part of construction costs allocated to irrigation, 50 to 60 years after the beneficiaries start to use the facilities and the water supply furnished thereby?

Answer. The direct beneficiaries will start repayment as soon as water is available. Irrigators, municipalities, and power consumers will be the direct beneficiaries and net revenues from the start of service will be credited to costs allocated to each of those functions. Indirect beneficiaries will also assume repayment responsibilities at the start of the payout period through the conservancy district.

The question of deferment probably refers to that portion of the irrigation allocation to which power and municipal water revenues are applied after the cost of those two functions are repaid. Power and municipal water revenues could also be applied to irrigation from the beginning of the payout schedule. However, that procedure would not comply with the Collbran formula used for the study. Thus the deferment in application of power and municipal water revenues to the irrigation allocation is the result of the formula used.

Actually, because the Fryingpan-Arkansas project is a true multiple-purpose development, the repayment aspect should be viewed in its entirety and not necessarily by function or component. The plain facts are that the irrigators cannot alone repay in 40 or 50 years the cost of facilities which will last hundreds of years. The project as a whole is financially and economically sound. Each function and each direct beneficiary contributes toward the overall as well as toward the specific costs.

10. (*b*) Question. Is it not implicit in the reclamation law from its inception that the irrigation water users, in view of interest-free financing, would start to repay the reimbursable cost chargeable to irrigation as soon as the works are put into operation and at a rate per year that would pay off the obligation without interest in the period prescribed by law (now 40 years)?

Answer. No. Reclamation law has not been static—it has changed with the times and with the needs. In its broadest sense, reclamation law consists not only of the basic legislation but also specific authorizations for individual projects and purposes.

The Reclamation Act of June 17, 1902 (32 Stat. 388) provided for a 10-year repayment period. Because of difficulties experienced by many settlers on reclamation projects, the Extension Act of August 13, 1914, lengthened the repayment period to 20 years. On May 25, 1926, the Omnibus Adjustment Act (44 Stat. 636) lengthened the repayment period from 20 to 40 years. The 40-year repayment period was reaffirmed in the Interior Appropriation Act, 1940, approved May 10, 1939, and in the act of August 11, 1939, both of which dealt with water conservation and utility projects.

The Reclamation Project Act of 1939, approved August 4, 1939 (53 Stat. 1187) substantially modified earlier reclamation laws and made it possible to adjust many difficulties of the water users. Among other things it provided for allocating the cost of multiple-purpose projects among various benefiting functions. Section 9 (d) provides for the repayment of construction costs allocated to irrigation over a 40-year period exclusive of a maximum 10-year development period. This provision closely follows earlier reclamation law. Section 9 (e) provides for an alternative type of agreement known as a utility or water service contract. Under this section the Secretary may enter into either short-term or long-term contracts to furnish irrigation water for periods not exceeding 40 years. Thus succeeding contracts may be made so that the ultimate full repayment period might extend to 80, 120, 160 years, or even longer.

Within prescribed limits irrigation repayment contracts are specially drafted for the particular project to be constructed. In several cases the Congress has recognized the value and soundness of the Bureau's multipurpose projects by specifically authorizing that payment of reimbursable costs allocated to irrigation could be made beyond the 40-year period, which is the limitation in terms

of time in which the Secretary of the Interior is authorized to utilize the automatic authorization procedures. Examples are as follows:

Collbran project, Colorado	50-year repayment period.
Paonia project, Colorado	68-year repayment period.
Hayden Lake unit, Rathdrum Prairie project, Idaho	67-year repayment period.
Mancos project, Colorado	60-year repayment period.
Gila project, Arizona	Do.
Lewiston Orchards project, Idaho	50-year repayment period.
Vermejo project, New Mexico	No set period, based on repayment ability.

Thus on numerous occasions the Congress has emphasized that irrigation repayment should be based on the ability-to-pay concept. Properly speaking, however, the ability-to-pay concept involves consideration of the annual amount and length of the repayment period.

A special type of repayment contract is needed for the Fryingpan-Arkansas project not only because of its complexity, but to provide an equitable basis for long-term operations. The Government will actually have triple security for repayment of the irrigation obligation after the power and municipal costs are repaid. It will then receive revenues from irrigation, power, and municipal water and still have features with long useful lives.

10. (*c*) Question. Is it not true that the Federal Government and the taxpayers would have to bear a greately increased cost in meeting interest on this investment under such prolonged deferment in starting repayment?

Answer. There is no doubt that prolongation of repayment also means prolongation of interest cost. Conversely, deferment of an investment also means loss of benefits. The question of interest can become quite involved. In the case of irrigation investment, interest is an economic cost and not a project financial cost because such investments are interest-free by direction of the Congress. In this respect irrigation projects are in the same category as flood-control projects, or any others, constructed for the national welfare. However, in order to present as true a picture as possible, interest is considered as an expense in the economic analysis. That analysis discloses that for the project as a whole, the annual benefits will exceed the annual costs. Thus, although interest is a factor to be considered from the national viewpoint it is not of such magnitude that it impairs the feasibility of the project.

10. (*d*) Question. What would be the additional cost of interest to the Federal Government and the taxpayers, resulting from such deferment in starting repayment?

Answer. Interest on the unpaid balance of irrigation investment to be repaid by power and municipal water at the rate of 2½ percent annually would amount to $47,913,000 simple interest and $101,778,000 compound interest between payout year 1 and the year in which repayment is started by those 2 functions. It should be realized that this total interest cost is offset by benefits which would be foregone without the investment. Derivation of the interest is as follows:

	Simple interest	Compound interest
Irrigation plant paid by power revenue: $27,847,000 at 2½ percent for 53 years.	$36,897,000	$75,226,000
Irrigation plant paid by municipal water: $6,885,000 at 2½ percent for 64 years.	11,016,000	26,552,000
Total	47,913,000	101,778,000

10. (*e*) Question. Is it not possible that proposed delay in starting repayment of a substantial portion of the costs would extend beyond the useful life of the project or at least of some features thereof?

Answer. No. Annual operating expenses include provision for replacement of depreciable features. The tunnels, dams, reservoirs, and canals—which represent the greatest portion of the construction cost—have extremely long useful lives. If propertly maintained, a useful life of 200 years is not overly optimistic. Thus, a 69-year repayment period comprises less than one-third of the useful life of the principal works at conservative estimates.

11. (*a*) Question. Based upon the costs allocated to irrigation, what would be the construction cost per acre for the total area to be served, and what would be the equivalent cost per acre on a full water supply basis?

Answer. A total of 322,000 acres would be served by the irrigation water made available by the Fryingpan-Arkansas project which would reduce the present average shortage from 1.05 acre-feet per acre to an average shortage of 0.48 acre-feet per acre. The cost allocated to irrigation as of October 1953 is $78,272,000. Using this cost and the area served, the cost per acre of irrigated land would be $243.

The equivalent cost per acre on a full water supply basis (average shortage 1.05 acre-feet per acre) would be $434 per acre.

11. (*b*) Question. As compared to these costs, what is the present average value per acre of the irrigated land to be served by the proposed project, and what would be its sale value with proposed project in operation?

Answer. The weighted average value of the presently irrigated land in the Arkansas Valley (project area), based on the 1950 census data is $225 per acre. These values range from $140 per acre in Bent County to $480 per acre in Fremont County.

Average land values with the Fryingpan-Arkansas project in operation would range from $300 to $800 per acre depending upon location and other related factors. The average would probably be about $400 per acre. Irrigated land, now provided with irrigation pumps, furnishing essentially the same amount of water as the project would furnish, are selling within this range of prices.

The value of water is not reflected in the value of the land directly, because the equity in the water right remains with the mortgagee, in fact, in this case the Federal Government, until paid for.

12. (*a*) Question. What would be the cost per acre-foot of the water proposed to be furnished for irrigation?

Answer. As shown on page 88 of House Document 187, the total supply of water made available by the project at the irrigation headworks would average 189,800 acre-feet annually. This quantity includes the original water supply plus usable return flows. Benefits accrue from the use of the total supply, therefore, the economic cost, rather than the principal cost, is regarded as a better measure. The annual economic cost is $2,295,000 at October 1953 construction costs as shown in table 14. That cost divided by 189,800 acre-feet gives an annual cost of $12.09 per acre-foot of water.

12. (*b*) Question. What is the proposed rate per acre-foot to be charged for irrigation water supply and what would be the total return per acre-foot for irrigation water supply, including tax receipts from conservancy district?

Answer. Although the project would make available at the irrigation headworks 189,800 acre-feet annually, under existing State law it appears doubtful that a service charge can be levied against all usable return flows. Therefore, repayment must be computed on the basis of 143,200 acre-feet. The conservancy district tax will somewhat compensate for the additional water from return flows. The following tabulation, also shown in table 5, gives the quantity of water, proposed rate for irrigation service, and total return:

Service	Acre-feet	Rate	Gross revenue
Project water	56,700	$5.40	$306,180
Storage and regulation of Twin Lakes County diversions	12,500	3.00	37,500
Regulation of winter water	74,000	2.25	166,500
District tax			178,475
Total	143,200		688,655

12. (*c*) Question. In view of statements made by the Department of Agriculture that the economic feasibility of that portion of the project involving diversions of water from the Colorado Basin remains open to serious question, and further that the transmountain diversion features of the project should be analyzed separately and their justification determined on the basis of incremental effects where added to those parts of the project designed to make more effective use of the water supply already available in the upper Arkansas Basin, what do such separate evaluations show in: (1) comparative costs per acre and (2) in costs per acre-foot?

Answer. This question is closely related to questions 5 (*a*) and 5 (*b*) to which the reader is referred. Arriving at the incremental cost of utilizing the imported water would require lengthy and costly studies if the data are to be of the same

caliber as the present studies. Sufficient time has not been allowed nor are funds available to make such computations.

From a practical standpoint it is doubtful that the results of such studies would be conclusive one way or the other. Certain basic assumptions would be required and the validity of the assumptions could be debated in perpetuity. For example, numerous alternatives could be considered for eastern-slope water only. The most ecenomical alternative might be one not readily adaptable into the comprehensive plan. In such an instance the incremental cost of the larger plan would obviously be fallacious. The various components of the present plan are so interrelated that breaking out a substantial portion of the water supply at the upper end of the system would set up a chain reaction of consequences.

The present plan has been devised for two major purposes: (*a*) to alleviate needs and (*b*) to maximize the use of a natural resource with accepted principles of project formulation. A smaller project would nullify full attainment of both of those objectives. Inasmuch as the present plan of development is economically and financially sound, numerous studies of smaller projects and segments would largely be a costly academic approach.

However, if sufficient time and funds were made available, the studies suggested by the Department of Agriculture could be made.

12. (*d*) Question. What comments would you make on additional statements made by the Department of Agriculture?

Answer. The only additional comment in the Department of Agriculture's letter of May 23, 1952, concerns provision for replacement of any national-forest facilities that may be impaired by the proposed project. This would be done to the fullest practicable extent. The following statement is extracted from the project substantiating report, page 62 of House Document No. 187, 83d Congress, 1st session:

"A site plan or general layout drawing would be prepared for all construction sites showing structures peculiar to the construction period and their relation to the ultimate installations. Consideration would be given to proposals of the National Park Service, Fish and Wildlife Service, Forest Service, and other Government agencies as a means of coordinating the activities and recommendations of all agencies concerned with the location of Bureau of Reclamation structures.

"Land acquisition for reservoir sites, canal rights-of-way and related facilities would include consideration for maximizing, within statutory limitations, fish, wildlife, and recreational values. This consideration is essential if full public values are to be realized and if use problems, which have developed at existing Bureau features, are to be minimized on new projects."

Reference should also be made to paragraph 87 of the report of the regional director which appears on page 40 of House Document 187. The paragraph states: "Continued studies and investigations in the project area and in contiguous areas within the drainage of both slopes should be pursued vigorously on a departmental basis, in cooperation with other Federal, State, and local agencies, toward the objective of wise conservation and beneficial use of all natural resources."

It is our understanding that the Department of Agriculture's letter of May 23, 1952, superseded the earlier letter dated October 10, 1951. The following brief comments pertain to the October 10, 1951, letter. Our area engineer at Pueblo, Colo., has participated actively in the interagency planning effort in the Arkansas-White-Red River Basins. The Fryingpan-Arkansas project will be described in that forthcoming report. Separable segments of the multiple-purpose Fryingpan-Arkansas project are evaluated separately. The suggestion that the contemplated conversion of winter flow be made a condition of Federal participation would only defer the project. Detailed studies will be required for the resolution of that and other problems and such studies ordinarily are not made until after the project has been authorized. Such matters will be resolved in the preconstruction definite plan report. The Fryingpan-Arkansas project will not affect the Maroon-Snowmass primitive area in any way. With respect to small-scale irrigation projects at higher altitudes on both sides of the Continental Divide: There are no such projects or potentialities in the diversion area, the Aspen Reservoir provides such protection for lower areas, only water reasonably surplus to the needs of the western slope will be diverted, and importation of any water could only help rather than harm small-scale irrigation projects on the eastern slope.

12. (*e*) Question. What assurances do you have from authoritative sources that: (1) The conservancy district will pay a 1-mill ad valorem tax; (2) the

water users will pay $5.40 per acre-foot of water; and (3) the present holders of rights to winter flow will agree to a conversion of such rights to storage and make payment for this water at the rate proposed?

Answer. (1) For the answer to this question see the sixth paragraph of Mr. Beise's letter which is appended hereto as exhibit A.

(2) This question is answered by letters from the Bessemer Ditch Co., 22,000 acres (exhibit C); Catlin Canal, 19,000 acres (exhibit D); the Twin Lakes Reservoir and Canal Co., 44,000 acres (exhibit E); and the Fort Lyon Canal, 91,000 acres (exhibit F). Mr. Beise's letter (exhibit A) also discusses the willingness of water users to pay $5.40 per acre-foot.

(3) Exhibit G is a copy of a letter from Mr. H. H. Christy, director, Water Development Association of Southeastern Colorado. Mr. Christy describes the difficulties of obtaining firm commitments on conversion of winter water. Exhibit H contains copies of resolutions by several ditch companies pertaining to winter water.

13. (*a*) Question. What would be the ratio of benefits to costs, based upon direct benefits only evaluated over a period of: (1) 100 years, (2) 50 years?

Answer. Table 14 shows the derivation of the two benefit-cost analyses by function. Using direct benefits only, October 1953 prices and interest at 2½ percent, the project has a benefit-cost ratio of 1.02 evaluated over a period of 100 years and 0.84 over a period of 50 years.

13. (*b*) Question. Is it not the view of other Federal departments and agencies that benefits on a project such as that proposed should be evaluated over a period of 50 years as a usual proper maximum?

Answer. No. Past practices of various Federal agencies indicate variation in the period of analysis. The Department of Agriculture has assumed a perpetual life basis for watershed treatment. The Corps of Engineers usually limits the period to 50 years but uses a longer period in certain cases. Bureau of Reclamation procedures specify that the period of analysis be the estimated economically useful life or 100 years whichever is less, with provision for consideration of salvage value.

The Federal Interagency River Basin Committee, in its report of May 1950, recommended that the period of analysis be the economic life or 100 years, whichever is less. Credit could be taken for salvage value.

The recent Bureau of the Budget Circular A–47 specifies that the period of analysis be the economic life or 50 years whichever is less. No mention is made of salvage value.

There has been, still is, and likely will continue to be divergent views among Federal agencies as to the proper period of analysis. Such divergence is only natural because different types of features with different purposes and uses are being constructed.

The major features of the Fryingpan-Arkansas project will have useful lives far exceeding 100 years. Therefore, limiting the analysis to a 50-year period is unrealistic.

13. (*c*) Question. If it should be considered proper to include indirect benefits in appraising the benefit-cost ratio of such a project, on either a regional or national basis, should not detriments which may also accrue from project operation, such as lost power revenue on other projects, be evaluated and deducted from benefits? What would these indirect detriments amount to and what would be the benefit-cost ratios if they were taken into account?

Answer. It is acknowledged that where indirect benefits are claimed, associated detriments should also be considered. The Fryingpan-Arkansas analysis utilizes indirect benefits for irrigation only. No indirect benefits are claimed for power, municipal water, flood control, sediment control, or other function.

Most of the water supply of the project is already available to the eastern slope, either as native waters or from existing transmountain importations. The project would impose no radical change of existing irrigation use. The only change which the project would effectuate would be additional nonconsumptive uses for power and a change in time of use through reregulation. Therefore, the project will impose no indirect detriments as far as existing supplies are concerned.

With respect to new importations, there is a possibility that some detriments might accrue. Colorado River water is used for power generation at Hoover, Davis, and Parker Dams. It is also used for irrigation and municipal purposes. However, by terms of the Colorado River compact and the upper basin States compact, the water proposed for diversion by the project is Colorado's share, to be used as the State desires.

Any study of the detrimental effects would have to consider not only such present uses, but also whether or not the proposed exportations could be considered spills or unused releases from the dams on the Colorado River, and numerous technical aspects such as losses en route to the powerplants.

Any western slope detriments are considered more than offset because: (*a*) no indirect power benefits are claimed, (*b*) more power would be produced on the eastern slope than at present, and (*c*) the water to be exported has been allocated to the State of Colorado.

14. (*a*) Question. How much interest on the national debt occasioned by the proposed project would be borne by the Nation's taxpayers, assuming repayment of the construction cost (including interest during construction) in accordance with the presently proposed repayment plan covering a period of 69 years, and assuming a reasonable period of construction. (NOTE.—The presently proposed repayment plan was referred to at the hearings as the "Collbran or modified Collbran formula.")

Answer. This question is closely related to questions 10 (*c*) and 10 (*d*) which are concerned with interest cost resulting from deferment or repayment on a portion of the irrigation investment.

As was stated in answering those questions, any attempt to relate total construction costs and interest directly to repayment is apt to produce distorted results on a project as extensive as the Fryingpan-Arkansas. By law, investments for flood control and fish-wildlife facilities are not only interest free but are also nonreimbursable. Both of those investments produce benefits which offset the allocated construction cost and the interest cost. The investment in irrigation facilities is also noninterest bearing by law; however, the principal is reimbursable. The irrigation investment produces or results in the production of income extending beyond the farmers who use the water.

For these reasons it is impracticable to measure the worth or value of a development such as the Fryingpan-Arkansas project solely in terms of cost and repayment. The benefit-cost analysis more adequately evaluates the true effects. On the cost side it includes principal, interest during construction, interest on the total investment, and expenses such as operation, maintenance, and replacement—all of which are presented as an annual cost. The benefits include all measurable effects including those stemming from investments which are nonreimbursable by law. When annual benefits equal or exceed the total annual costs, the investment is justified.

As shown in table IA, page 5 of House Document 187, the annual benefits exceed the annual costs in the ratio of 1.48 to 1.00. The direct benefits alone exceed the total annual costs in the ratio of 1.05 to 1.00. The following tabulation presents the derivation and comparison of costs and revenues covering a 69-year period based upon the data used in the Secretary's report, pages 3–8, House Document 187. The total interest cost at year 69 is $245,826,000 for all functions regardless of whether the investment is nonreimbursable or noninterest bearing by law. This interest cost is more than supported by benefits.

Investment (construction cost plus interest during construction)	$179,492,000
Compound interest for 69 years at 2½ percent	806,769,000
Less net revenue compounded with interest at 2½ percent for 69 years	560,943,000
Interest cost at year 69	245,826,000
Present worth of interest	44,738,000

NOTE.—The above computation is based upon compound interest cost of 2½ percent on Federal investment. We further have assumed that revenues from the project, as well as compound interest on those revenues should be applied against the interest cost.

14. (*b*) Question. How much interest on the national debt occasioned by the proposed project would be borne by the Nation's taxpayers, assuming repayment of the construction cost as revised (including interest during construction) in accordance with the repayment plan and method of financing presented and recommended in the planning report of the Bureau of Reclamation (dated January 1950), involving the diversion and use of the interest component of power and municipal water supply revenues for repayment of a substantial part of the irrigation investment, and assuming a reasonable period of construction?

Answer. The cost and repayment estimates contained in the substantiating report of January 1950 were revised by Secretary McKay's report dated April 30, 1953; therefore, no analysis need be made of the superseded repayment plan.

TABLE 1.—*Fryingpan-Arkansas project—Comparison of construction and annual costs (January 1953 and October 1953 construction price levels)*

Feature	Estimated construction costs		Annual costs based on long-range projected prices
	January 1953	October 1953	
DAMS AND RESERVOIRS			
Replacement reservoir, Aspen, 28,000 acre-feet	$8,102,000	$8,325,000	$3,880
Sugar Loaf Reservoir, enlargement, 117,000 acre-feet	7,248,000	7,447,000	4,440
Twin Lakes Reservoir, enlargement, 260,000 acre-feet	10,222,000	10,503,000	6,270
Salida Afterbay Reservoir, 200 acre-feet	310,000	318,000	1,940
Pueblo Reservoir, 400,000 acre-feet	43,453,000	44,648,000	16,290
Main purification plant (Pueblo)	7,148,000	7,390,000	44,040
DIVERSION WORKS			
Hunter Creek diversion dam	48,000	49,000	360
Hunter Creek extension diversion works	15,000	15,000	110
Chapman Gulch diversion dam	54,000	55,000	400
Lime Creek diversion dam	30,000	31,000	150
Last Chance diversion dam	30,000	31,000	150
North Fork diversion dam	30,000	31,000	150
Ivanhoe diversion dam	30,000	31,000	150
Fryingpan River diversion dam	16,000	16,000	110
Snowden diversion dam	205,000	209,000	1,550
Wapaco diversion dam	228,000	232,000	1,740
Chalk Creek diversion dam	62,000	63,000	470
Oil Creek diversion dam	138,000	141,000	1,080
PUMPING PLANTS			
Main municipal pumping plant (Pueblo)	1,470,000	1,520,000	111,660
Colorado Springs pumping plant	155,000	160,000	6,710
CANALS AND CONDUITS			
Hunter Creek-Aspen Canal	240,000	236,000	1,860
Hunter Creek extension canal	394,000	387,000	4,680
South Side collection conduit	9,209,000	9,453,000	2,400
North Side collection conduit	21,006,000	21,563,000	29,870
Fryingpan-Arkansas divide tunnel	10,095,000	10,363,000	2,920
Elbert power canal	1,759,000	1,729,000	26,660
Snowden Canal	587,000	577,000	5,630
Twin Lakes-Otero Canal	1,623,000	1,595,000	11,840
Otero-Wapaco Canal	2,188,000	2,151,000	15,980
Wapaco diversion canal	38,000	37,000	310
Wapaco Princeton Canal	2,466,000	2,424,000	18,940
Chalk Creek diversion canal	34,000	33,000	270
Princeton-Pancho Canal	2,023,000	1,989,000	15,570
Pancho-Salida Canal	2,508,000	2,465,000	18,380
Pueblo municipal water supply conduit	1,735,000	1,781,000	33,830
Arkansas Valley municipal water supply conduit	10,631,000	10,913,000	207,300
Oil Creek-Brush Hollow Canal	223,000	219,000	3,390
POWERPLANTS			
Elbert	1,137,000	1,175,000	56,920
Otero (Granite)	2,711,000	2,801,000	89,270
Wapaco	2,214,000	2,287,000	79,430
Princeton	1,733,000	1,790,000	68,420
Pancho	2,500,000	2,583,000	80,450
Salida	2,908,000	3,004,000	96,890
Pueblo	1,714,000	1,771,000	68,670
TRANSMISSION LINES			
Dillon-Elbert	755,000	741,000	12,530
Elbert-Otero	127,000	125,000	2,280
Otero-Wapaco	104,000	102,000	1,730
Wapaco-Princeton	174,000	171,000	3,130
Princeton-Pancho	80,000	79,000	1,450
Pancho-Salida	35,000	34,000	630
Gunnison-Salida (completed under CBT project)	1,020,000	1,020,000	16,720
Saguache-Salida	494,000	485,000	9,330
Salida-Pueblo	1,124,000	1,104,000	20,220
Pueblo-Colorado Springs	439,000	431,000	8,740
Colorado Springs-Limon	727,000	714,000	13,340

TABLE 1.—*Fryingpan-Arkansas project—Comparison of construction and annual costs (January 1953 and October 1953 construction price levels)*—Continued

Feature	Estimated construction costs		Annual costs based on long-range projected prices
	January 1953	October 1953	
SUBSTATION			
Leadville	$118,000	$133,000	$5,690
Salida (completed under CBT project)	139,000	139,000	2,900
Gunnison (completed under CBT project)	253,000	253,000	3,670
Saguache	149,000	168,000	4,500
Canon City	302,000	340,000	7,530
Pueblo	205,000	231,000	9,560
Colorado Springs	925,000	1,042,000	18,290
SWITCHYARDS			
Elbert	482,000	543,000	7,740
Otero	558,000	628,000	12,010
Wapaco	540,000	608,000	10,920
Princeton	507,000	571,000	8,990
Pancho	434,000	489,000	9,360
Salida	770,000	867,000	15,310
Pueblo	594,000	669,000	9,640
GENERAL PROPERTY			
General communication system	105,000	108,000	----------
General service equipment (25 percent construction facilities)	1,053,000	1,081,000	----------
Gunnison maintenance shop (completed under CBT project)	15,000	15,000	----------
Total	172,898,000	177,432,000	1,357,740

TABLE 2.—*Fryingpan-Arkansas project—Segregation of costs*

Feature	January 1953 construction costs					Annual operation, maintenance, and replacement					
	Total	Specific costs			Joint costs	Total			Specific operation, maintenance, and replacement		Joint operation, maintenance, and replacement
		Power	Municipal water supply	Fish and Wildlife [1]		Operation and maintenance	3 percent, 50 years replacement	Operation, maintenance, and replacement	Power	Municipal water	
Aspen Dam and Reservoir	$8,102,000				$8,102,000	$2,000	$840	$2,840			$2,840
Sugar Loaf Dam and Reservoir	7,248,000				7,248,000	2,760	810	3,570			3,570
Twin Lakes Dam and Reservoir	10,222,000				10,222,000	3,900	950	4,850			4,850
Salida afterbay	310,000	$310,000				1,870	60	1,930	$1,930		
Pueblo Dam and Reservoir	43,453,000				43,453,000	6,200	3,570	9,770			9,770
Main purification plant	7,148,000		$7,148,000			33,750	9,360	43,110		$43,110	
Pueblo pumping plant	1,470,000		1,470,000			93,320	16,620	109,940		109,940	
Colorado Springs pumping plant	155,000		155,000			4,780	1,750	6,530		6,530	
Hunter Creek-Aspen Canal	288,000				288,000	2,150	50	2,200			2,200
Hunter Creek extension canal	409,000			$409,000		4,700	80	4,780			4,780
South Side collection system	9,263,000			806,000	8,457,000	2,800		2,800			2,800
North Side collection system	21,126,000			383,000	20,743,000	29,530	850	30,380			30,380
Fryingpan-Arkansas Tunnel	10,111,000			1,232,000	8,879,000	3,030		3,030			3,030
Snowden Canal	792,000				792,000	7,000	120	7,120			7,120
Arkansas power canal:											
Elbert Canal	1,759,000	1,759,000				26,250	360	26,610	26,610		
Twin Lakes-Otero Canal	1,623,000	1,623,000				11,460	330	11,790	11,790		
Otero-Wapaco Canal	2,188,000	2,188,000				15,470	450	15,920	15,920		
Wapaco diversion	266,000	266,000				1,990	60	2,050	2,050		
Wapaco-Princeton Canal	2,466,000	2,466,000				18,370	510	18,880	18,880		
Chalk Creek diversion	96,000	96,000				720	20	740	740		
Princeton-Pancho Canal	2,023,000	2,023,000				15,100	420	15,520	15,520		
Pancho-Salida Canal	2,508,000	2,508,000				17,800	520	18,320	18,320		
Oil Creek-Brush Hollow Canal	361,000		361,000			4,390	80	4,470		4,470	
Pueblo water conduit	1,735,000		1,735,000			26,020	6,910	32,930		32,930	
Arkansas Valley water conduit	10,631,000		10,631,000			159,460	44,570	204,030		204,030	
Powerplants	14,917,000	14,917,000				378,540	144,270	522,810	522,810		
Powerplant switchyards	3,885,000	3,885,000				34,940	24,460	59,400	59,400		
Transmission lines	5,079,000	5,079,000				31,150	52,150	83,300	83,300		
Transmission substations	2,091,000	2,091,000				31,130	31,960	63,090	63,090		
General property	1,173,000				1,173,000						
Total	172,898,000	39,211,000	21,500,000	2,830,000	109,357,000	970,580	342,130	1,312,710	840,360	401,010	71,340

[1] These amounts represent the costs of enlargement of the collection and diversion system specifically for fish and wildlife purposes. It is shown as a specific cost because the allocation to this function is limited to the costs of these added facilities totaling $2,830,000.

TABLE 2–A.—*Fryingpan-Arkansas project—Segregation of costs*

Feature	October 1953 construction costs				
	Total	Specific costs			Joint costs
		Power	Municipal water supply	Fish and wildlife [1]	
Aspen Dam and Reservoir	8,325,000				$8,325,000
Sugar Loaf Dam and Reservoir	7,447,000				7,447,000
Twin Lakes Dam and Reservoir	10,503,000				10,503,000
Salida Afterbay	318,000	$318,000			
Pueblo Dam and Reservoir	44,648,000				44,648,000
Main purification plant	7,390,000		$7,390,000		
Pueblo pumping plant	1,520,000		1,520,000		
Colorado Springs pumping plant	160,000		160,000		
Hunter Creek-Aspen Canal	285,000				285,000
Hunter Creek extension canal	402,000			$402,000	
South Side collection system	9,508,000			818,000	8,690,000
North Side collection system	21,687,000			390,000	21,297,000
Fryingpan-Arkansas tunnel	10,379,000			1,266,000	9,113,000
Snowden Canal	786,000				786,000
Arkansas power canal:					
Elbert Canal	1,729,000	1,729,000			
Twin Lakes-Otero Canal	1,595,000	1,595,000			
Otero-Wapaco Canal	2,151,000	2,151,000			
Wapaco diversion	269,000	269,000			
Wapaco-Princeton Canal	2,424,000	2,424,000			
Chalk Creek diversion	96,000	96,000			
Princeton-Pancho Canal	1,989,000	1,989,000			
Pancho-Salida Canal	2,465,000	2,465,000			
Oil Creek-Brush Hollow Canal	360,000		360,000		
Pueblo water conduit	1,781,000		1,781,000		
Arkansas Valley water conduit	10,913,000		10,913,000		
Powerplants	15,411,000	15,411,000			
Powerplant switchyards	4,375,000	4,375,000			
Transmission lines	5,006,000	5,006,000			
Transmission substations	2,306,000	2,306,000			
General property	1,204,000				1,204,000
Total	177,432,000	40,134,000	22,124,000	2,876,000	112,298,000

[1] These amounts represent the costs of enlargement of the collection and diversion system specifically for fish and wildlife purposes. It is shown as a specific cost because the allocation to this function is limited to the costs of these added facilities totaling $2,876,000 as described in report of the regional director for mitigation of losses.

TABLE 3.—*Fryingpan-Arkansas project—Cost allocation, January 1953 construction costs*

Item	Total	Municipal water	Irrigation	Power	Flood control	Fish and wildlife
Annual benefits	$9,317,000	$1,662,000	$4,355,000	$2,702,000	$598,000	
Less annual operation, maintenance and replacement costs	1,313,000	412,000	59,000	842,000	0	0
Annual net benefits	8,004,000	1,250,000	4,296,000	1,860,000	598,000	
Justifiable investment	295,910,000	45,771,000	157,305,000	68,107,000	21,897,000	[1] $2,830,000
Alternative expenditure	184,161,000	33,575,000	81,097,000	42,148,000	27,341,000	
Alternative justifiable expenditure	181,547,000	33,575,000	81,097,000	42,148,000	21,897,000	2,830,000
Less specific costs	60,711,000	21,500,000	0	39,211,000	0	
Remainder	120,836,000	12,075,000	81,097,000	2,937,000	21,897,000	
Percent distribution	100.0	10.2	68.7	2.5	18.6	
Joint costs	$112,187,000	$11,154,000	$75,128,000	$2,734,000	$20,341,000	
Specific costs	60,711,000	21,500,000	0	39,211,000	0	$2,830,000
Allocation	172,898,000	32,654,000	75,128,000	41,945,000	20,341,000	2,380,000

[1] Incremental costs of features on western slope, as described in report of the regional director for mitigation of losses.

TABLE 3–A.—*Fryingpan-Arkansas project—Cost allocation, October 1953 construction prices*

Item	Total	Municipal water	Irrigation	Power	Flood control	Fish and wildlife
Annual benefits	$9,317,000	$1,662,000	$4,355,000	$2,702,000	$598,000	
Less annual operation, maintenance, and replacement costs	[1] 1,313,000	412,000	59,000	842,000	0	0
Annual net benefits	[2] 8,004,000	1,250,000	4,296,000	1,860,000	598,000	
Justifiable investment	[2] 295,910,000	45,771,000	157,305,000	68,107,000	21,897,000	$2,876,000
Alternative expenditure	184,161,000	33,575,000	81,097,000	42,148,000	27,341,000	0
Alternative justifiable expenditure	181,593,000	33,575,000	81,097,000	42,148,000	21,897,000	2,876,000
Less specific costs	65,134,000	22,124,000	0	40,134,000	0	2,876,000
Remainder	116,459,000	11,451,000	81,097,000	2,014,000	21,897,000	0
Percent distribution	100	9.8	69.7	1.7	18.8	
Joint costs	$112,298,000	$11,005,000	$78,272,000	$1,909,000	$21,112,000	
Specific costs	65,134,000	22,124,000	0	40,134,000	0	$2,876,000
Allocation	177,432,000	33,129,000	78,272,000	42,043,000	21,112,000	2,876,000

[1] Annual operation, maintenance, and replacement costs are based on long range projected prices. Change corresponding to increased construction costs between January and October 1953 is negligible.
[2] Fish and wildlife benefits not included.

TABLE 4.—*Fryingpan-Arkansas project—Allocation of capital and annual costs to project purposes*

Feature	Capital costs based on January 1953 price levels						Annual costs based on long-range projected prices			
	Total estimated cost	Allocation of capital costs					Total annual cost	Allocation of annual costs		
		Municipal water	Irrigation	Power	Flood control	Fish and wildlife		Municipal water	Irrigation	Power
DAMS AND RESERVOIRS										
Replacement reservoir, Aspen, 28,000 acre-feet	$8,102,000	$1,048,000	$7,054,000				$3,880	$500	$3,380	
Sugar Loaf Reservoir, enlargement, 117,000 acre-feet	7,248,000	937,000	6,311,000				4,440	570	3,870	
Twin Lakes Reservoir, enlargement, 260,000 acre-feet	10,222,000	970,000	6,533,000	$2,719,000			6,270	590	3,290	$2,390
Salida Afterbay Reservoir, 200 acre-feet	310,000			310,000			1,940			1,940
Pueblo Reservoir, 400,000 acre-feet	43,453,000	2,988,000	20,124,000		$20,341,000		16,290	2,110	14,180	
Main purification plant (Pueblo)	7,148,000	7,148,000					44,040	44,040		
DIVERSION WORKS										
Hunter Creek diversion dam	48,000	6,000	42,000				360	50	310	
Hunter Creek extension diversion works	15,000					$15,000	110	10	100	
Chapman Gulch diversion dam	54,000	7,000	47,000				400	50	350	
Lima Creek diversion dam	30,000	4,000	26,000				150	20	130	
Last Chance diversion dam	30,000	4,000	26,000				150	20	130	
North Fork diversion dam	30,000	4,000	26,000				150	20	130	
Ivanhoe diversion dam	30,000	4,000	26,000				150	20	130	
Fryingpan River diversion dam	16,000	2,000	14,000				110	10	100	
Snowden diversion dam	205,000	26,000	179,000				1,550	200	1,350	
Wapaco diversion dam	228,000			228,000			1,740			1,740
Chalk Creek diversion dam	62,000			62,000			470			470
Oil Creek diversion dam	138,000	138,000					1,080	1,080		
PUMPING PLANTS										
Main municipal pumping plant (Pueblo)	1,470,000	1,470,000					111,660	111,660		
Colorado Springs pumping plant	155,000	155,000					6,710	6,710		
CANALS AND CONDUITS										
Hunter Creek, Aspen Canal	240,000	31,000	209,000				1,860	240	1,620	
Hunter Creek extension canal	394,000					394,000	4,680	700	3,980	
South side collection conduit	9,209,000	1,086,000	7,317,000			806,000	2,400	360	2,040	
North side collection conduit	21,006,000	2,666,000	17,957,000			383,000	29,870	5,630	24,240	
Fryingpan-Arkansas divide tunnel	10,095,000	1,146,000	7,717,000			1,232,000	2,920	380	2,540	
Elbert power canal	1,759,000			1,759,000			26,660			26,660
Snowden canal	587,000	76,000	511,000				5,630	730	4,900	
Twin Lakes-Otero Canal	1,623,000			1,623,000			11,840			11,840
Otero-Wapaco Canal	2,188,000			2,188,000			15,980			15,980
Wapaco diversion cnal	38,000			38,000			310			310
Wapaco Princeton Canal	2,466,000			2,466,000			18,940			18,940
Chalk Creek diversion canal	34,000			34,000			270			270

Princeton-Pancho Canal	2,023,000			2,023,000			15,570			15,570	
Pancho-Salida Canal	2,508,000			2,508,000			18,380			18,380	
Pueblo municipal water supply conduit	1,735,000	1,735,000					33,830	33,830			
Arkansas Valley municipal water supply conduit	10,631,000	10,631,000					207,300	207,300			
Oil Creek-Brush Hollow Canal	223,000	223,000					3,390	3,390			
POWERPLANTS											
Elbert	1,137,000			1,137,000			56,920			56,920	
Otero (Granite)	2,711,000			2,711,000			89,270			89,270	
Wapaco	2,214,000			2,214,000			79,430			79,430	
Princeton	1,733,000			1,733,000			68,420			68,420	
Pancho	2,500,000			2,500,000			80,450			80,450	
Salida	2,908,000			2,908,000			96,890			96,890	
Pueblo	1,714,000			1,714,000			68,670			68,670	
TRANSMISSION LINES											
Dillon-Elbert	755,000			755,000			12,530			12,530	
Elbert-Otero	127,000			127,000			2,280			2,280	
Otero-Wapaco	104,000			104,000			1,730			1,730	
Wapaco-Princeton	174,000			174,000			3,130			3,130	
Princeton-Pancho	80,000			80,000			1,450			1,450	
Pancho-Salida	35,000			35,000			630			630	
Gunnison-Salida (completed under CBT project)	1,020,000			1,020,000			16,720			16,720	
Saguache-Salida	494,000			494,000			9,330			9,330	
Salida-Pueblo	1,124,000			1,124,000			20,220			20,220	
Pueblo-Colorado Springs	439,000			439,000			8,740			8,740	
Colorado Springs-Limon	727,000			727,000			13,340			13,340	
SUBSTATION											
Leadville	118,000			118,000			5,690			5,690	
Salida (completed under CBT project)	139,000			139,000			2,900			2,900	
Gunnison (completed under CBT project)	253,000			253,000			3,670			3,670	
Saguache	149,000			149,000			4,500			4,500	
Canon City	302,000			302,000			7,530			7,530	
Pueblo	205,000			205,000			9,560			9,560	
Colorado Springs	925,000			925,000			18,290			18,290	
SWITCHYARDS											
Elbert	482,000			482,000			7,740			7,740	
Otero	558,000			558,000			12,010			12,010	
Wapaco	540,000			540,000			10,920			10,920	
Princeton	507,000			507,000			8,990			8,990	
Pancho	434,000			434,000			9,360			9,360	
Salida	770,000			770,000			15,310			15,310	
Pueblo	594,000			594,000			9,640			9,640	
GENERAL PROPERTY											
General communication system	105,000	13,000	92,000								
General service equipment (25 percent construction facilities)	1,053,000	136,000	917,000								
Gunnison maintenance shop (completed under CBT project)	15,000			15,000							
Total	172,898,000	32,654,000	75,128,000	41,945,000	20,341,000	2,830,000	1,357,740	420,220	66,770	870,750	

TABLE 4–A. *Fryingpan-Arkansas project—Allocation of capital costs to project purposes*

Feature	Capital costs—based on October 1953 price levels						
	Total estimated cost	Allocation of capital costs					Total annual cost [1]
		Municipal water	Irrigation	Power	Flood control	Fish and wildlife	
Dams and reservoirs:							
Replacement reservoir, Aspen, 28,000 acre-feet	$8,325,000	$1,026,000	$7,299,000				
Sugar Loaf Reservoir, enlargement, 117,000 acre-feet	7,447,000	918,000	6,529,000				
Twin Lakes Reservoir, enlargement, 260,000 acre-feet	10,503,000	1,061,000	7,548,000	$1,894,000			
Salida Afterbay Reservoir, 200 acre-feet	318,000			318,000			
Pueblo Reservoir, 400,000 acre-feet	44,648,000	2,902,000	20,634,000		$21,112,000		
Main purification plant (Pueblo)	7,390,000	7,390,000					
Diversion works:							
Hunter Creek diversion dam	49,000	6,000	43,000				
Hunter Creek extension diversion works	15,000					$15,000	
Chapman Gulch diversion dam	55,000	6,000	47,000			2,000	
Lime Creek diversion dam	31,000	4,000	27,000				
Last Chance diversion dam	31,000	4,000	27,000				
North Fork diversion dam	31,000	4,000	27,000				
Ivanhoe diversion dam	31,000	4,000	27,000				
Fryingpan River diversion dam	16,000	2,000	11,000			3,000	
Snowden diversion dam	209,000	26,000	183,000				
Waco diversion dam	232,000			232,000			
Chalk Creek diversion dam	63,000			63,000			
Oil Creek diversion dam	141,000	141,000					
Pumping plants:							
Main municipal pumping plant (Pueblo)	1,520,000	1,520,000					
Colorado Springs pumping plant	160,000	160,000					
Canals and conduits:							
Hunter Creek, Aspan Canal	236,000	29,000	207,000				
Hunter Creek extension canal	387,000					387,000	
South Side collection conduit	9,453,000	1,064,000	7,573,000			816,000	
North Side collection conduit	21,563,000	2,610,000	18,563,000			390,000	
Fryingpan-Arkansas Divide Tunnel	10,363,000	1,122,000	7,978,000			1,263,000	
Elbert Power Canal	1,729,000			1,729,000			
Snowden Canal	577,000	71,000	506,000				
Twin Lakes, Otero Canal	1,595,000			1,595,000			
Otero, Wapaco Canal	2,151,000			2,151,000			
Wapaco diversion canal	37,000			37,000			
Wapaco Princeton Canal	2,424,000			2,424,000			
Chalk Creek diversion canal	33,000			33,000			
Princeton, Pancho Canal	1,989,000			1,989,000			
Pancho, Salida Canal	2,465,000			2,465,000			

Pueblo municipal water supply conduit	1,781,000	1,781,000					
Arkansas Valley municipal water supply conduit	10,913,000	10,913,000					
Oil Creek, Brush Hollow Canal	219,000	219,000					
Powerplants:							
Elbert	1,175,000			1,175,000			
Otero (Granite)	2,801,000			2,801,000			
Wapaco	2,287,000			2,287,000			
Princeton	1,790,000			1,790,000			
Pancho	2,583,000			2,583,000			
Salida	3,004,000			3,004,000			
Pueblo	1,771,000			1,771,000			
Transmission lines:							
Dillon-Elbert	741,000			741,000			
Elbert-Otero	125,000			125,000			
Otero-Wapaco	102,000			102,000			
Wapaco-Princeton	171,000			171,000			
Princeton-Pancho	79,000			79,000			
Pancho-Salida	34,000			34,000			
Gunnison-Salida (completed under C. B. T. project)	1,020,000			1,020,000			
Saguache-Salida	485,000			485,000			
Salida-Pueblo	1,104,000			1,104,000			
Pueblo-Colorado Springs	431,000			431,000			
Colorado Springs-Limon	714,000			714,000			
Substation:							
Leadville	133,000			133,000			
Salida (completed under CBT project)	139,000			139,000			
Gunnison (completed under CBT project)	253,000			253,000			
Saguache	168,000			168,000			
Canon City	340,000			340,000			
Pueblo	231,000			231,000			
Colorado Springs	1,042,000			1,042,000			
Switchyards:							
Elbert	543,000			543,000			
Otero	628,000			628,000			
Wapaco	608,000			608,000			
Princeton	571,000			571,000			
Pancho	489,000			489,000			
Salida	867,000			867,000			
Pueblo	669,000			669,000			
General property:							
General communication system	108,000	13,000	95,000				
General service equipment (25 percent construction facilities)	1,081,000	133,000	948,000				
Gunnison maintenance shop (completed under CBT project)	15,000			15,000			
Total	177,432,000	33,129,000	78,272,000	42,043,000	21,112,000	2,876,000	

[1] Annual costs are based on long-range-project prices, consequently any increase due to change of construction price index between January and October 1953 is negligible.

TABLE 13.—*Fryingpan-Arkansas project—estimated cost of municipal water*

Unit or service	Water supplied (acre-feet)	Unit costs								Total cost per acre-foot of water supplied			Total gross annual revenue
		Supply system		Pumping		Water treatment		Delivery system					
		Repayment of investment	Annual operation, maintenance and repairs	Repayment of investment	Annual operation, maintenance and repairs	Repayment of investment	Annual operation, maintenance and repairs	Repayment of investment	Annual operation, maintenance and repairs	Repayment of investment	Annual operation, maintenance and repairs	Total	
Colorado Springs	[1] 2,700	$26.44	$0.36					$9.77	$2.48	$36.21	$2.84	$39.05	$105,430
Pueblo:													
Storage of Wurtz ditch diversions	2,000	4.30	.30	$1.62	$3.33	$10.09	$1.31	1.25	1.30	17.26	6.24	23.50	47,000
Improvement of present supply	21,000	3.30	.30	1.62	3.33	10.09	1.31	1.25	1.30	16.26	6.24	22.50	472,500
Project water delivered	3,000	22.30	.30	1.62	3.33	10.09	1.31	1.25	1.30	35.26	6.24	41.50	124,500
Valley towns:													
Trunkline [2]	7,274	22.30	.30	1.62	3.33	10.09	1.31	22.45	26.70	56.46	31.64	88.10	640,840
Crowley branch line	96	22.30	.30	1.62	3.33	10.09	1.31	84.59	23.96	118.60	28.90	147.50	14,160
Eads	170	22.30	.30	1.62	3.33	10.09	1.31	153.42	63.53	187.43	68.47	255.90	43,500
Colorado Fuel & Iron Corp. [3]	4,000	1.70	.30							1.70	.30	2.00	8,000
Water for future requirements	1,260	22.30	.30							22.30	.30	22.60	28,480
Total	41,500												1,484,410

[1] System price for 3,200 acre-feet replaced, chargeable to 2,700 acre-feet supplied.
[2] Trunkline serves following communities direct: Manzanola, Rocky Ford, La Junta, Las Animas, Lamar and Wiley.
[3] Storage for additional storage for additional water acquired by Colorado Fuel & Iron Corp.

NOTE.—Components of the unit costs for the various functions are preliminary estimates subject to adjustment when final plans are prepared. The total rates to the municipalities result in revenue sufficient to retire allocated costs of appropriate supply, treatment, and distribution works.

TABLE 5
FINANCIAL STUDY NO. 1
FRYINGPAN-ARKANSAS PROJECT
(Based on October 1953 construction prices. Repayment of power and municipal water investments with interest at 2-1/2 percent on the unpaid balance. Project facilities as shown in the planning report.)

December 1953
Accompanies reply to letter of Nov. 10, 1953 from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	
	POWER						MUNICIPAL AND INDUSTRIAL WATER SUPPLY							IRRIGATION				RECAPITULATION		
Year of Study	Net operating revenues	Repayable Components of net power revenues		Investment Repayment			Gross revenues from municipal & industrial water supply	Annual operation, maintenance & replacement costs	Net revenues from municipal and industrial water plant	Repayment Components of net revenues		Investment repayment of municipal and industrial water plant	Irrigation plant paid by municipal water revenues	Gross irrigation revenues	Annual operation maintenance & replacement costs	Net revenues (including Conservancy District Tax)	Investment repayment Interest free balance to be repaid	Net project revenues	Earned surplus	Year of Study
		Interest 2-1/2%	Excess over interest	Interest Bearing: Electric plant	Interest Bearing: Balance to be repaid	Interest Free: Irrigation plant paid by power revenues				Interest 2-1/2%	Excess over interest									
0				$21,533,000	$21,533,000	$27,847,000						$13,898,000	$6,885,000				$43,540,000			0
1	$ 728,990	$ 538,825	$ 190,165	28,376,000	28,185,835		$ 758,430	$ 167,000	$ 591,430	$ 347,450	$ 243,980	13,654,020		$ 689,000	$ 67,000	$ 622,000	42,918,000	$ 1,942,420	- 0 -	1
2	897,360	704,646	192,714	35,019,000	34,636,121		758,430	167,000	591,430	341,350	250,080	13,403,940					42,296,000	2,110,790		2
3	1,356,750	865,903	490,847	39,317,000	38,443,274		758,430	167,000	591,430	335,098	256,332	13,147,608					41,674,000	2,570,180		3
4	1,427,320	961,082	466,238	39,317,000	37,977,036		758,430	167,000	591,430	328,690	262,740	12,884,868					41,052,000	2,640,750		4
5	1,427,320	949,426	477,894	39,317,000	37,499,142		758,430	167,000	591,430	322,122	269,308	16,880,560					40,430,000	2,640,750		5
6	1,427,320	937,479	489,841	39,317,000	37,009,301		939,940	225,240	714,700	422,014	292,686	16,587,874					39,808,000	2,764,020		6
7	1,427,320	925,233	502,087	39,317,000	36,507,214		939,940	225,240	714,700	414,697	300,003	16,287,871					39,186,000	2,764,020		7
8	1,427,320	912,680	514,640	39,317,000	35,992,574		939,940	225,240	714,700	407,197	307,503	15,980,368					38,564,000	2,764,020		8
9	1,427,320	899,814	527,506	43,355,000	39,503,068		939,940	225,240	714,700	399,509	315,191	15,665,177					37,942,000	2,764,020		9
10	1,504,400	987,577	516,823		38,986,245		939,940	225,240	714,700	391,629	323,071	23,686,106					37,320,000	2,841,100		10
11		974,656	529,744		38,456,501		1,238,330	339,190	899,140	592,153	306,987	28,757,119					36,698,000	3,025,540		11
12		961,412	542,988		37,913,513		1,427,740	412,620	1,015,120	718,928	296,192	28,460,927					36,076,000	3,141,520		12
13		947,838	556,562		37,356,951		1,427,740	412,620	1,015,120	711,523	303,597	30,590,330					35,454,000	3,141,520		13
14		933,924	570,476		36,786,475		1,484,410	420,220	1,064,190	764,758	299,432	30,290,898					34,832,000	3,190,590		14
15		919,662	584,738		36,201,737					757,272	306,918	29,983,980					34,210,000			15
16		905,043	599,357		35,602,380					749,600	314,590	29,669,390					33,588,000			16
17		890,060	614,340		34,988,040					741,735	322,455	29,346,935					32,966,000			17
18		874,701	629,699		34,358,341					733,673	330,517	29,016,418					32,344,000			18
19		858,958	645,442		33,712,899					725,410	338,780	28,677,638					31,722,000			19
20		842,822	661,578		33,051,321					716,941	347,249	28,330,389					31,100,000			20
21		826,283	678,117		32,373,204					708,260	355,930	27,974,459					30,478,000			21
22		809,330	695,070		31,678,134					699,361	364,829	27,609,630					29,856,000			22
23		791,953	712,447		30,965,687					690,241	373,949	27,235,681					29,234,000			23
24		774,142	730,258		30,235,429					680,892	383,298	26,852,383					28,612,000			24
25		755,886	748,514		29,486,915					671,310	392,880	26,459,503					27,990,000			25
26		737,173	767,227		28,719,688					661,488	402,702	26,056,801					27,368,000			26
27		717,992	786,408		27,933,280					651,420	412,770	25,644,031					26,746,000			27
28		698,332	806,068		27,127,212					641,101	423,089	25,220,942					26,124,000			28
29		678,180	826,220		26,300,992					630,524	433,666	24,787,276					25,502,000			29
30		657,525	846,875		25,454,117					619,682	444,508	24,342,768					24,880,000			30
31		636,353	868,047		24,586,070					608,569	455,621	23,887,147					24,258,000			31
32		614,652	889,748		23,696,322					597,179	467,011	23,420,136					23,636,000			32
33		592,408	911,992		22,784,330					585,503	478,687	22,941,449					23,014,000			33
34		569,608	934,792		21,849,538					573,536	490,654	22,450,795					22,392,000			34
35		546,238	958,162		20,891,376					561,270	502,920	21,947,875					21,770,000			35
36		522,284	982,116		19,909,260					548,697	515,493	21,432,382					21,148,000			36
37		497,732	1,006,668		18,902,592					535,810	528,380	20,904,002					20,526,000			37
38		472,565	1,031,835		17,870,757					522,600	541,590	20,362,412					19,904,000			38
39		446,769	1,057,631		16,813,126					509,060	555,130	19,807,282					19,282,000			39
40		420,328	1,084,072		15,729,054					495,182	569,008	19,238,274					18,660,000			40
41		393,226	1,111,174		14,617,880					480,957	583,233	18,655,041					18,038,000			41
42		365,447	1,138,953		13,478,927					466,376	597,814	18,057,227					17,416,000			42
43		336,973	1,167,427		12,311,500					451,431	612,759	17,444,468					16,794,000			43
44		307,788	1,196,612		11,114,888					436,112	628,078	16,816,390					16,172,000			44
45		277,872	1,226,528		9,888,360					420,410	643,780	16,172,610					15,550,000			45
46		247,209	1,257,191		8,631,169					404,315	659,875	15,512,735					14,928,000			46
47		215,779	1,288,621		7,342,548					387,818	676,372	14,836,363					14,306,000			47
48		183,564	1,320,836		6,021,712					370,909	693,281	14,143,082					13,684,000			48
49		150,543	1,353,857		4,667,855					353,577	710,613	13,432,469					13,062,000			49
50		116,696	1,387,704		3,280,151					335,812	728,378	12,704,091					12,440,000			50
51		82,004	1,422,396		1,857,755					317,602	746,588	11,957,503					11,818,000			51
52		46,444	1,457,956		399,799	27,847,000				298,938	765,252	11,192,251					11,196,000			52
53		9,995	399,799		-0-	26,752,394				279,806	784,384	10,407,867					10,571,000			53
54		-0-	-0-			25,247,994				260,197	803,993	9,603,874					9,952,000			54
55						23,743,594				240,097	824,093	8,779,781					9,330,000			55
56						22,239,194				219,495	844,695	7,935,086					8,708,000			56
57						20,734,794				198,377	865,813	7,069,273					8,086,000			57
58						19,230,394				176,732	887,458	6,181,815					7,464,000			58
59						17,725,994				154,545	909,645	5,272,170					6,842,000			59
60						16,221,594				131,804	932,386	4,339,784					6,220,000			60
61						14,717,194				108,495	955,695	3,384,089					5,598,000			61
62						13,212,794				84,602	979,588	2,404,501					4,976,000			62
63						11,708,394				60,113	1,004,077	1,400,424	6,885,000				4,354,000			63
64						10,203,994				35,011	1,029,179	371,245	6,885,000				3,732,000			64
65						8,699,594				9,281	371,245	-0-	6,201,336				3,110,000			65
66						7,195,194				-0-	-0-		5,137,146				2,488,000			66
67						5,690,794							4,072,956				1,866,000			67
68						4,186,394							3,008,766				1,244,000			68
69						2,681,994	1,484,410		1,064,190				1,944,576				622,000	3,190,590		69
70						1,177,594	1,484,410		1,064,190				880,386	689,000	67,000	622,000	-0-	3,190,590	- 0 -	70
71	1,504,400			43,355,000		-0-	1,300,606	420,220	880,386				-0-					2,384,786	326,806	71
Total	$104,819,820	$ 33,291,014	$43,355,000	$43,355,000	-0-	-0-	$98,497,636	$27,498,390	$70,999,246	$29,796,246	$34,318,000	$ -0-	$6,885,000	$48,230,000	$4,690,000	$43,540,000	-0-	$219,359,066	$ 326,806	

SUMMARY OF COST ALLOCATIONS AND REPAYMENT

Total project construction cost	$177,432,000	
Interest during construction	6,837,000	
Total project investment	$184,269,000	
Less nonreimbursable costs:		
Flood control	$ 21,112,000	
Fish and wildlife conservation	2,876,000	
Interest during construction	4,336,000	
Balance reimbursable	$155,945,000	
2-1/2 percent interest bearing allocations:		
Commercial power:		
Construction costs	$ 42,043,000	
Interest during construction	1,312,000	
Allocation		$43,355,000
Municipal and industrial water:		
Construction costs	$ 33,129,000	
Interest during construction	1,189,000	
Allocation		34,318,000
Non-interest bearing allocations:		
Irrigation		78,272,000
Total		$155,945,000

Repayment of irrigation costs:

By Conservancy District	$43,540,000
By power revenues	27,847,000
By municipal and industrial water revenues	6,885,000
Total	$78,272,000

SOURCE OF IRRIGATION REVENUES

Service	Water delivery acre-foot	Rate	Gross Revenue
Sale of project water	56,700	$5.40	$306,180
Storage and regulation of Twin Lakes Company diversions	12,500	3.00	37,500
Regulation of winter water	74,000	2.25	166,500
District tax (1 mill levy - 10% administrative cost)			173,475
Total gross annual revenue			$683,655

SOURCE OF MUNICIPAL WATER REVENUES DURING REPAYMENT PERIOD

Unit or Service	Price per acre-foot water	Years 1 to 5 of payout period: Water sold acre-foot	Years 1 to 5: Gross revenue	Years 6 to 10 of payout period: Water sold acre-foot	Years 6 to 10: Gross revenue	Year 11 of payout period: Water sold acre-foot	Year 11: Gross revenue	Years 12 and 13 of payout period: Water sold acre-foot	Years 12 and 13: Gross revenue	Year 14 to end of payout period: Water sold acre-foot	Year 14 to end: Gross revenue
Colorado Springs	$ 39.05	2,700	$105,430	2,700	$105,430	2,700	$ 105,430	2,700	$ 105,430	2,700	$ 105,430
Pueblo											
Storage of Wurtz Ditch water	23.50	2,000	47,000	2,000	47,000	2,000	47,000	2,000	47,000	2,000	47,000
Improved quality present supply	22.50	21,000	472,500	21,000	472,500	21,000	472,500	21,000	472,500	21,000	472,500
Project water	41.50	3,000	124,500	3,000	124,500	3,000	124,500	3,000	124,500	3,000	124,500
Valley towns											
Trunk line deliveries	88.10	11	1,000	1,748	154,030	5,124	452,420	7,274	640,840	7,274	640,840
Crowley branch line	147.50							7	990	96	14,160
Eads branch line	255.90									170	43,500
Colo. Fuel & Iron Corporation Improved supply	2.00	4,000	8,000	4,000	8,000	4,000	8,000	4,000	8,000	4,000	8,000
Water held for future demand	22.60			1,260	28,480	1,260	28,480	1,260	28,480	1,260	28,480
Totals		32,711	$758,430	35,708	$939,940	39,084	$1,238,330	41,241	$1,427,760	41,500	$1,484,410

TABLE 5A

FRYINGPAN-ARKANSAS PROJECT

POWER SYSTEM AVERAGE RATE AND REPAYMENT STUDY NO. 1-A

(Construction costs at October 1953 price levels. Power rates 5.5 mills per kwh for firm energy and 3.5 mills per kwh for secondary energy. Interest rate 2-1/2 percent.)

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Year of Study	Sales of electric energy millions of kilowatthours			Operating revenue Sales of electric energy			Revenue deductions			Net operating revenues	Income deductions Repayment of investment		Investment repayment from power revenues plant in service at end of year						Earned surplus cumulative	Year of Study
													Interest bearing		Interest free		Allowable unpaid balance			
	Firm	Non-firm	Total Cols. 2 & 3	Firm 5.5 mills	Non-firm 3.5 mills	Total Cols. 5 & 6	Operation, maintenance & overhead	Provision for replacement	Total Cols. 8 & 9	Cols. 7-10	Interest 2-1/2%	Principal	Electric plant	Balance to be repaid	Irrigation plant	Balance to be repaid	Electric plant	Irrigation plant		
0													$21,533,000	$21,533,000	$27,847,000	$27,847,000	$21,533,000	$27,847,000	-0-	0
1	177.2	45.1	222.3	$ 974,600	$ 157,850	$ 1,132,450	$ 269,380	$ 134,080	$ 403,460	$ 728,990	$ 538,825	$ 190,165	28,376,000	28,185,835			28,376,000			1
2	222.3	61.8	284.1	1,222,650	216,300	1,438,950	358,270	183,320	541,590	897,360	704,646	192,714	35,019,000	34,636,121			35,019,000			2
3	315.2	85.4	400.6	1,733,600	298,900	2,032,500	451,050	224,700	675,750	1,356,750	865,903	490,847	39,317,000	38,443,274			39,317,000			3
4	339.5	97.2	436.7	1,867,250	340,200	2,207,450	530,410	249,720	780,130	1,427,320	961,082	466,238	39,317,000	37,977,036			39,317,000			4
5	339.5	97.2	436.7	1,867,250	340,200	2,207,450	530,410	249,720	780,130	1,427,320	949,426	477,894	39,317,000	37,499,142			39,317,000			5
6	339.5	97.2	436.7	1,867,250	340,200	2,207,450	530,410	249,720	780,130	1,427,320	937,479	489,841	39,317,000	37,009,301			39,317,000			6
7	339.5	97.2	436.7	1,867,250	340,200	2,207,450	530,410	249,720	780,130	1,427,320	925,233	502,087	39,317,000	36,507,214			39,317,000			7
8	339.5	97.2	436.7	1,867,250	340,200	2,207,450	530,410	249,720	780,130	1,427,320	912,680	514,640	39,317,000	35,992,574			39,317,000			8
9	339.5	97.2	436.7	1,867,250	340,200	2,207,450	530,410	249,720	780,130	1,427,320	899,814	527,506	43,355,000	39,503,068			43,355,000			9
10	370.0	97.2	467.2	2,035,000	340,200	2,375,200	586,590	284,210	870,800	1,504,400	887,577	516,823		38,986,245						10
11											874,656	529,744		38,456,501						11
12											861,412	542,988		37,913,513						12
13											847,838	556,562		37,356,951						13
14											833,924	570,476		36,786,475						14
15											819,662	584,738		36,201,737						15
16											805,043	599,357		35,602,380						16
17											790,060	614,340		34,988,040						17
18											774,701	629,699		34,358,341						18
19											758,958	645,442		33,712,899						19
20											742,822	661,578		33,051,321						20
21											726,283	678,117		32,373,204						21
22											709,330	695,070		31,678,134						22
23											691,953	712,447		30,965,687						23
24											674,142	730,258		30,235,429						24
25											655,886	748,514		29,486,915						25
26											637,173	767,227		28,719,688						26
27											617,992	786,408		27,933,280						27
28											598,332	806,068		27,127,212						28
29											578,180	826,220		26,300,992						29
30											557,525	846,875		25,454,117						30
31											536,353	868,047		24,586,070						31
32											514,652	889,748		23,696,322						32
33											492,408	911,992		22,784,330						33
34											469,608	934,792		21,849,538						34
35											446,238	958,162		20,891,376						35
36											422,284	982,116		19,909,260						36
37											397,732	1,006,668		18,902,592						37
38											372,565	1,031,835		17,870,757						38
39											346,769	1,057,631		16,813,126						39
40											320,328	1,084,072		15,729,054						40
41											293,226	1,111,174		14,617,880						41
42											265,447	1,138,953		13,478,927						42
43											236,973	1,167,427		12,311,500						43
44											207,788	1,196,612		11,114,888						44
45											177,872	1,226,528		9,888,360						45
46											147,209	1,257,191		8,631,169						46
47											115,779	1,288,621		7,342,548						47
48											83,564	1,320,836		6,021,712						48
49											50,543	1,353,857		4,667,855						49
50											16,696	1,387,704		3,280,151			43,355,000			50
51											32,004	1,422,396		1,857,755			21,822,000			51
52											46,444	1,457,956		399,799	$27,847,000		14,979,000			52
53											9,995	399,799		-0-	26,752,394		8,336,000			53
54											-0-	-0-			25,247,994		4,038,000			54
55															23,743,594		4,038,000			55
56															22,239,194		4,038,000			56
57															20,734,794		4,038,000			57
58															19,230,394		4,038,000			58
59															17,725,994		4,038,000			59
60															16,221,594		-0-			60
61															14,717,194					61
62															13,212,794					62
63															11,708,394					63
64															10,203,994					64
65															8,699,594					65
66															7,195,194					66
67															5,690,794					67
68															4,186,394					68
69															2,681,994					69
70															1,177,594				-0-	70
71	370.0	97.2	467.2	2,035,000	340,200	2,375,200	586,590	284,210	870,800	1,504,400	-0-	-0-	43,355,000	-0-	27,847,000	-0-	-0-	-0-	326,806	71
Totals	25,691.7	6,801.9	32,493.6	$141,304,350	$23,806,650	$165,111,000	$40,629,740	$19,661,440	$60,291,180	$104,819,820	$ 33,291,011	$ 43,355,000	$43,355,000	-0-	$27,847,000	-0-	-0-	-0-	$326,806	Totals

Notes:

1. Cols. 2-4. Sales were estimated from Market Area Data.

2. Cols. 5-7. The average rates required to produce an annual revenue sufficient to pay all operation, maintenance, and overhead expenses; provide a fund for replacement; repay the investment in the electric plant with interest @ 2-1/2 percent; repay the portion of the investment in irrigation plant without interest are shown below:

   Firm Energy. . . . . 5.5 mills per kilowatthour
   Non-firm energy. . . 3.5 mills per kilowatthour

3. Col. 8 Operation, maintenance, and overhead were estimated as follows:

Arkansas Power Canal.	$109,030
Transmission lines and substations. . . .	62,280
Powerplants and penstocks	413,480
Allocation of joint facilities.	1,800
Total.	$586,590

4. Col. 9. Requirements for provision for replacement at 2-1/2 percent in 50 years were estimated as follows:

F.P.C. Acct. No.	Item of Property	Amount
321	Structures and improvements	$ 17,920
322	Reservoirs, dams, waterways & penstocks	13,400
323-325	Water wheels, generators & miscellaneous acc.	129,490
343	Switchyards and substations	60,040
371	General plant	3,770
345-346	Transmission lines	58,950
	Allocation of joint facilities	640
		$284,210

5. Col. 14. The total estimated electric plant investment is determined as follows:

Investments	Amounts
Hunter Creek-Aspen Canal.	$ 285,000
Replacement Reservoir - Aspen	[illegible],325,000
Fryingpan Collection System	31,597,000
Fryingpan-Arkansas Tunnel	10,379,000
Sugar Loaf Reservoir.	7,447,000
Snowden Canal	786,000
Twin Lakes Reservoir.	10,503,000
Arkansas Power Canals:	
Elbert Canal.	1,729,000
Twin Lakes-Otero Canal.	1,595,000
Otero-Wapaco Canal.	2,151,000
Wapaco-Princeton Canal.	2,693,000
Princeton-Pancho Canal.	2,085,000
Pancho-Salida Canal	2,465,000
Salida Afterbay	318,000
Pueblo Reservoir.	44,648,000
Powerplants, penstocks, and switchyards	19,786,000
Transmission system	7,312,000
Municipal water facilities.	22,124,000
General property.	1,204,000
Interest during construction.	6,837,000
Total.	$184,289,000

This investment was allocated as follows:

(1) Fully reimbursable from power revenues:	
(a) Construction costs.	$42,043,000
(b) Interest during construction.	1,312,000
	$43,355,000
(2) Partially reimbursable from power revenues:	
Irrigation investment	$78,272,000
Borne by Conservancy District	43,540,000
Borne by municipal water revenues	6,885,000
Borne by power revenues	$27,847,000
(3) Total reimbursable from power revenues:	$71,202,000
(4) Other allocated portions:	
Municipal water, project system	$33,129,000
Municipal water, interest during construction.	1,189,000
Municipal water, total.	34,318,000
Flood control	21,112,000
Fish and Wildlife	2,876,000
Nonreimbursable interest during construction.	4,336,000

December 11, 1953

62757 O - 55(Face p. 372) No. 2

TABLE 6

Analysis Without Specific Municipal Water Features

FRYINGPAN-ARKANSAS PROJECT

Segregation of Costs

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

Feature	October 1953 Construction Costs					Annual Operation, Maintenance and Replacement					
	Total	Specific Costs			Joint costs	Total			Specific O.M. & R.		Joint O.M. & R.
		Power	Municipal Water Supply	Fish and Wildlife a/		O. & M.	2-1/2% - 50-years Replacement	O.M. & R.	Power	Municipal water	
Aspen Dam and Reservoir	$ 8,325,000				8,325,000	2,000	1,880	3,880			3,880
Sugar Loaf Dam and Reservoir	7,447,000				7,447,000	2,760	1,680	4,440			4,440
Twin Lakes Dam and Reservoir	10,503,000				10,503,000	3,900	2,370	6,270			6,270
Salida Afterbay	318,000	318,000				1,870	70	1,940	1,940		
Pueblo Dam and Reservoir	44,648,000				44,648,000	6,200	10,090	16,290			16,290
Hunter Creek-Aspen Canal	285,000				285,000	2,150	70	2,220			2,220
Hunter Creek Extension Canal	402,000			402,000		4,700	90	4,790			4,790
South Side Collection System	9,508,000			818,000	8,690,000	2,800		2,800			2,800
North Side Collection System	21,687,000			390,000	21,297,000	29,530	940	30,470			30,470
Fryingpan-Arkansas Tunnel	10,379,000			1,266,000	9,113,000	3,030		3,030			3,030
Snowden Canal	786,000				786,000	7,000	180	7,180			7,180
Arkansas Power Canal:											
Elbert Canal	1,729,000	1,729,000				26,250	410	26,660	26,660		
Twin Lakes-Otero Canal	1,595,000	1,595,000				11,460	380	11,840	11,840		
Otero-Wapaco Canal	2,151,000	2,151,000				15,470	510	15,980	15,980		
Wapaco Diversion	269,000	269,000				1,990	60	2,050	2,050		
Wapaco-Princeton Canal	2,424,000	2,424,000				18,370	570	18,940	18,940		
Chalk Creek Diversion	96,000	96,000				720	20	740	740		
Princeton-Pancho Canal	1,989,000	1,989,000				15,100	470	15,570	15,570		
Pancho-Salida Canal	2,465,000	2,465,000				17,800	580	18,380	18,380		
Powerplants	15,411,000	15,411,000				378,540	161,510	540,050	540,050		
Powerplant Switchyards	4,375,000	4,375,000				34,940	39,030	73,970	73,970		
Transmission Lines	5,006,000	5,006,000				31,150	58,950	90,100	90,100		
Transmission Substations	2,306,000	2,306,000				31,130	21,010	52,140	52,140		
General Property	1,204,000				1,204,000						
TOTALS	155,308,000	40,134,000		2,876,000	112,298,000	648,860	300,870	949,730	868,360		81,370

a/ These amounts represent the costs of enlargement of the collection and diversion system specifically for fish and wildlife purposes. It is shown as a specific cost because the allocation to this function is limited to the costs of these added facilities totalling $2,876,000 as described in report of the Regional Director for mitigation of losses.

Allocation of Costs

Purpose	Construction Costs	Annual O.M.&R.	Interest during construction
Municipal water	$ 11,005,000	$ 12,200	$ 480,000
Irrigation	78,272,000	67,000	3,414,000
Power	42,043,000	870,800	1,312,000
Flood Control	21,112,000	—	921,000
Fish and Wildlife	2,876,000	—	—
Total	$155,308,000	$950,000	$6,127,000

62757 O - 55(Face p. 372) No. 3

TABLE 7
FINANCIAL STUDY NO. 2
FRYINGPAN-ARKANSAS PROJECT
(Based on October 1953 construction prices. Repayment of power and municipal water investments with interest at 2-1/2 percent on the unpaid balance.)
(Specific municipal water supply features eliminated.)

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	POWER						MUNICIPAL AND INDUSTRIAL WATER SUPPLY							IRRIGATION				RECAPITULATION		
Year of Study	Net operating revenues	Repayable components of net power revenues		Investment Repayment			Gross revenues from municipal & industrial water supply	Annual operation, maintenance & replacement costs	Net revenues from municipal and industrial water plant	Repayment Components of net revenues		Investment repayment of municipal and industrial water plant	Irrigation plant paid by municipal water revenues	Gross irrigation revenues	Annual operation maintenance & replacement costs	Net revenues (including Conservancy District Tax)	Investment repayment Interest free balance to be repaid	Net project revenues	Earned surplus	Year of Study
		Interest 2-1/2%	Excess over interest	Interest Bearing: Electric plant	Interest Bearing: Balance to be repaid	Interest Free: Irrigation plant paid by power revenues				Interest 2-1/2%	Excess over interest									
0				$21,533,000	$21,533,000	$29,713,992														0
1	$ 728,990	$ 538,825	$ 190,165	28,376,000	28,185,835		$ 379,300	$ 12,200	$ 367,100	$ 287,128	$ 79,972	$11,485,100	$ 3,774,008	$ 689,000	$ 67,000	$ 622,000	$44,784,000	$ 1,718,090	-0-	1
2	897,360	704,646	192,714	35,019,000	34,636,121					285,128	81,972	11,323,156					44 162,000	1,886,160		2
3	1,356,750	865,903	490,847	39,317,000	38,443,274					283,079	84,021	11,239,135					43,540,000	2,345,850		3
4	1,427,320	961,082	466,238	39,317,000	37,977,036					280,978	86,122	11,153,013					42,918,000	2,416,420		4
5	1,427,320	949,426	477,894	39,317,000	37,499,142					278,825	88,275	11,064,738					42,296,000	2,416,420		5
6	1,427,320	937,479	489,841	39,317,000	37,009,301					276,618	90,482	10,974,256					41,674,000	2,416,420		6
7	1,427,320	925,233	502,087	39,317,000	36,507,214					274,356	92,744	10,881,512					41,052,000	2,416,420		7
8	1,427,320	912,680	514,640	39,317,000	35,992,574					272,038	95,062	10,786,450					40,430,000	2,416,420		8
9	1,427,320	899,814	527,506	43,355,000	39,503,068					269,661	97,439	10,689,011					39,808,000	2,416,420		9
10	1,504,400	987,577	516,823		38,986,245					267,225	99,875	10,589,136					39,186,000	2,416,420		10
11		974,656	529,744		38,456,501					264,728	102,372	10,486,764					38,564,000	2,493,500		11
12		961,412	542,988		37,913,513					262,169	104,931	10,381,833					37,942,000			12
13		947,838	556,562		37,356,951					259,546	107,554	10,274,279					37,320,000			13
14		933,924	570,476		36,786,475					256,857	110,243	10,164,036					36,698,000			14
15		919,662	584,738		36,201,737					254,101	112,999	10,051,037					36,076,000			15
16		905,043	599,357		35,602,380					251,276	115,824	9,935,213					35,054,000			16
17		890,060	614,340		34,988,040					248,380	118,720	9,816,493					34,832,000			17
18		874,701	629,699		34,358,341					245,412	121,688	9,694,805					34,210,000			18
19		858,958	645,442		33,712,899					242,370	124,730	9,570,075					33,588,000			19
20		842,822	661,578		33,051,321					239,252	127,848	9,442,227					32,966,000			20
21		826,283	678,117		32,373,204					236,056	131,044	9,311,183					32,344,000			21
22		809,330	695,070		31,678,134					232,780	134,320	9,176,863					31,722,000			22
23		791,953	712,447		30,965,687					229,422	137,678	9,039,185					31,100,000			23
24		774,142	730,258		30,235,429					225,980	141,120	8,898,065					30,478,000			24
25		755,886	748,514		29,486,915					222,452	144,648	8,753,417					29,856,000			25
26		737,173	767,227		28,719,688					218,835	148,265	8,605,152					29,234,000			26
27		717,992	786,408		27,933,280					215,129	151,971	8,453,181					28,612,000			27
28		698,332	806,068		27,127,212					211,330	155,770	8,297,411					27,990,000			28
29		678,180	826,220		26,300,992					207,435	159,665	8,137,746					27,368,000			29
30		657,525	846,875		25,454,117					203,444	163,656	7,974,090					26,746,000			30
31		636,353	868,047		24,586,070					199,352	167,748	7,806,342					26,124,000			31
32		614,652	889,748		23,696,322					195,159	171,941	7,634,401					25,502,000			32
33		592,408	911,992		22,784,330					190,860	176,240	7,458,161					24,880,000			33
34		569,608	934,792		21,849,538					186,454	180,646	7,277,515					24,258,000			34
35		546,238	958,162		20,891,376					181,938	185,162	7,092,353					23,636,000			35
36		522,284	982,116		19,909,260					177,309	189,791	6,902,562					23,014,000			36
37		497,732	1,006,668		18,902,592					172,564	194,536	6,708,026					22,392,000			37
38		472,565	1,031,835		17,870,757					167,701	199,399	6,508,627					21,770,000			38
39		446,769	1,057,631		16,813,126					162,716	204,384	6,304,243					21,148,000			39
40		420,328	1,084,072		15,729,054					157,606	209,494	6,094,749					20,526,000			40
41		393,226	1,111,174		14,617,880					152,369	214,731	5,880,018					19,904,000			41
42		365,447	1,138,953		13,478,927					147,000	220,100	5,659,918					19,282,000			42
43		336,973	1,167,427		12,311,500					141,498	225,602	5,434,316					18,660,000			43
44		307,788	1,196,612		11,114,888					135,858	231,242	5,203,074					18,038,000			44
45		277,872	1,226,528		9,888,360					130,077	237,023	4,966,051					17,416,000			45
46		247,209	1,257,191		8,631,169					124,151	242,949	4,723,102					16,794,000			46
47		215,779	1,288,621		7,342,548					118,078	249,022	4,474,080					16,172,000			47
48		183,564	1,320,836		6,021,712					111,852	255,248	4,218,832					15,550,000			48
49		150,543	1,353,857		4,667,855					105,471	261,629	3,957,203					14,928,000			49
50		116,696	1,387,704		3,280,151					98,930	268,170	3,689,033					14,306,000			50
51		82,004	1,422,396		1,857,755					92,226	274,874	3,414,159					13,684,000			51
52		46,444	1,457,956		399,799	29,713,992				85,354	281,746	3,132,413					13,062,000			52
53		9,995	399,799		-0-	28,619,386				78,310	288,790	2,843,623					12,440,000			53
54		-0-	-0-			27,114,986				71,091	296,009	2,547,614					11,818,000			54
55						25,610,586				63,690	303,410	2,244,204					11,196,000			55
56						24,106,186				56,105	315,995	1,933,209					10,574,000			56
57						22,601,786				48,330	318,770	1,614,439					9,952,000			57
58						21,097,386				40,361	326,739	1,287,700					9,330,000			58
59						19,592,986				32,193	334,907	952,793					8,708,000			59
60						18,088,586				23,820	343,280	609,513					8,086,000			60
61						16,584,186				15,238	351,862	257,651	3,774,008				7,464,000			61
62						15,079,786				6,441	257,651	-0-	3,671,000				6,842,000			62
63						13,575,386				-0-	-0-		3,303,900				6,220,000			63
64						12,070,986							2,936,800				5,598,000			64
65						10,566,586							2,569,700				4,976,000			65
66						9,062,186							2,202,600				4,354,000			66
67						7,557,786							1,835,500				3,732,000			67
68						6,053,386							1,468,400				3,110,000			68
69						4,548,986							1,101,300				2,488,000			69
70						3,044,586							734,200				1,866,000			70
71						1,540,186							367,100				1,244,000			71
72						35,786	379,300	12,200	367,100				-0-				622,000			72
73	1,504,400	-0-	-0-	43,355,000	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-		689,000	67,000	622,000	-0-	2,493,500 1,504,400	-0-	73
Totals	107,828,620	33,291,014	43,355,000	43,355,000	-0-	29,713,992	27,309,600	877,400	26,431,200	11,172,092	11,485,100	-0-	3,774,008	$49,608,000	$4,824,000	$44,784,000	-0-	$179,943,820	$1,468,614	Totals

SUMMARY OF COST ALLOCATIONS AND REPAYMENT

Total project construction costs	$155,308,000
Interest during construction	6,127,000
Total project investment	$161,435,000
Less nonreimbursable costs:	
Flood control	$ 21,112,000
Fish and wildlife conservation	2,876,000
Interest during construction	4,335,000
Balance reimbursable	$133,112,000
2-1/2 percent interest bearing allocations:	
Commercial power:	
Construction costs	$ 42,043,000
Interest during construction	1,312,000
Allocation	$ 43,355,000
Municipal and industrial water:	
Construction costs	$ 11,005,000
Interest during construction	480,000
Allocation	11,485,000
Non-interest bearing allocations:	
Irrigation	78,272,000
Total	$133,112,000

Repayment of irrigation costs:	
By Conservancy District	$44,784,000
By power revenues	29,713,992
By municipal and industrial water revenues	3,774,008
Total	$78,272,000

SOURCE OF IRRIGATION REVENUES

Service	Water delivery acre-foot	Rate	Gross Revenue
Sale of project water	56,700	$5.40	$306,180
Storage and regulation of Twin Lakes Company diversions	12,500	3.00	37,500
Regulation of winter water	74,000	2.25	166,500
District tax (1 mill levy - 10% administrative cost)			178,475
Total gross annual revenue			$638,655

SOURCE OF MUNICIPAL WATER REVENUES

Source	Service	Amount
Colorado Springs	Sale of 3,200 acre-feet @ $19.10	$ 44,280
Pueblo	Storage of Wurts Ditch water 2,000 acre-feet @ $4.60	9,200
Pueblo	Improved quality of present supply 21,000 acre-feet @ $3.60	75,600
Pueblo	Sale of 3,000 acre-feet @ $19.10	57,300
Valley towns	Sale of 7,540 acre-feet @ $19.10	144,014
Colorado Fuel & Iron Corporation	Improved quality of present supply 4,000 acre-feet @ $2.00	8,000
Unallocated	Sale of 1,260 acre-feet @ $19.10	24,066
Total		$379,300

Note: Components of the unit costs for the various functions are preliminary estimates subject to adjustment when final plans are prepared. The total rates to the municipalities result in revenue sufficient to retire allocated costs of appropriate supply, treatment, and distribution works.

TABLE 8
FRYINGPAN-ARKANSAS PROJECT
POWER SYSTEM AVERAGE RATE DETERMINATION STUDY

Assumed amortization of Power investment in 50 years following development period, interest at 3%

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Year of Study	Sales of electric energy millions of Kilowatthours			Operating Revenues Sales of electric energy			Revenue deductions			Net operating revenues	Income deductions Repayment of Investment		Investment repayment from power revenues Plant in service at end of year			Earned Surplus Cumulative	Year of Study
	Firm	Non-Firm	Total Cols.2 & 3	Firm 5.5 mills	Non-Firm 3.5 mills	Total Cols. 5 & 6	Operation Maintenance & Overhead	Provision for replacement	Total Cols. 8 & 9	Cols. 7-10	Interest 3%	Principal	Interest bearing Electric plant	Balance to be repaid	Allowable unpaid balance		
0													$20,864,000	$20,864,000	$20,864,000		0
1	177.2	45.1	222.3	$ 974,600	$ 157,850	$ 1,132,450	$ 269,380	$ 120,800	$ 390,180	$ 742,270	$ 625,920	$ 116,350	27,482,000	27,365,650	27,482,000	-0-	1
2	222.3	61.8	284.1	1,222,650	216,300	1,438,950	358,270	165,160	523,430	915,520	820,970	94,550	33,907,000	33,696,100	33,907,000		2
3	315.2	85.4	400.6	1,733,600	298,900	2,032,500	451,050	202,440	653,490	1,379,010	1,010,883	368,127	38,067,000	37,487,973	38,067,000		3
4	339.5	97.2	436.7	1,867,256	340,200	2,207,450	530,410	224,980	755,390	1,452,066	1,124,639	327,427	38,067,000	37,160,546	38,067,000		4
5	339.5	97.2	436.7	1,867,256	340,200	2,207,450	530,410	224,980	755,390	1,452,066	1,114,816	337,250	38,067,000	36,823,296	38,067,000		5
6	339.5	97.2	436.7	1,867,256	340,200	2,207,450	530,410	224,980	755,390	1,452,066	1,104,699	347,367	38,067,000	36,475,929	38,067,000		6
7	339.5	97.2	436.7	1,867,256	340,200	2,207,450	530,410	224,980	755,390	1,452,066	1,094,278	357,788	38,067,000	36,118,141	38,067,000		7
8	339.5	97.2	436.7	1,867,256	340,200	2,207,450	530,410	224,980	755,390	1,452,066	1,083,544	368,522	38,067,000	35,749,619	38,067,000		8
9	339.5	97.2	436.7	1,867,256	340,200	2,207,450	530,410	224,980	755,390	1,452,066	1,072,489	379,577	42,043,000	39,346,042	42,043,000		9
10	370.0	97.2	467.2	2,035,000	340,200	2,375,200	586,590	255,570	842,160	1,533,040	1,180,381	352,659		38,993,383			10
11											1,169,801	363,239		38,630,144			11
12											1,158,904	374,136		3 ,256,008			12
13											1,147,680	385,360		37,870,648			13
14											1,136,119	396,921		37,473,727			14
15											1,124,212	408,828		37,064,899			15
16											1,111,947	421,093		36,643,806			16
17											1,099,314	433,726		36,210,080			17
18											1,086,302	446,738		35,763,342			18
19											1,072,900	460,140		35,303,202			19
20											1,059,096	473,944		34,829,258			20
21											1,044,978	488,162		34,341,096			21
22											1,030,233	502,807		33,838,289			22
23											1,015,149	517,891		33,320,398			23
24											999,612	533,428		32,786,970			24
25											983,609	549,431		32,237,539			25
26											967,125	565,914		31,671,625			26
27											950,149	582,891		31,088,734			27
28											932,662	600,378		30,488,356			28
29											914,651	618,389		29,869,967			29
30											896,099	636,941		29,233,026			30
31											876,991	656,049		28,576,977			31
32											857,309	675,731		27,901,246			32
33											837,037	696,003		27,205,243			33
34											816,157	716,883		26,488,360			34
35											794,651	738,389		25,749,971			35
36											772,499	760,541		24,989,430			36
37											749,683	783,357		24,206,073			37
38											726,182	806,858		23,399,215			38
39											701,976	831,064		22,568,151			39
40											677,045	855,995		21,712,156			40
41											651,365	881,675		20,830,481			41
42											624,914	908,126		19,922,355			42
43											597,671	935,369		18,986,986			43
44											569,610	963,430		18,023,556			44
45											540,707	992,333		17,031,223			45
46											510,937	1,022,103		16,009,120			46
47											480,274	1,052,766		14,956,354			47
48											448,691	1,084,349		13,872,005			48
49											416,160	1,116,880		12,755,125			49
50											382,654	1,150,386		11,604,739	42,043,000		50
51											348,142	1,184,898		10,419,841	21,179,000		51
52											312,595	1,220,445		9,199,396	14,561,000		52
53											275,982	1,257,058		7,942,338	8,136,000		53
54											238,270	1,294,770		6,647,568	3,976,000		54
55											199,427	1,333,613		5,313,955	3,976,000		55
56											159,419	1,373,621		3,940,334	3,976,000		56
57											118,210	1,414,830		2,525,504	3,976,000		57
58											75,765	1,457,275		1,068,229	3,976,000	-0-	58
59	370.0	97.2	467.2	2,035,000	340,200	2,375,200	586,590	255,570	842,160	1,533,040	32,047	1,068,229	42,043,000	-0-	3,976,000	432,764	59
Total	21,251.7	5,635.5	26,887.2	$116,884,386	$19,724,250	$136,608,636	$33,590,660	$14,616,780	$48,207,440	$88,401,196	$45,925,432	$42,043,000	$42,043,000	-0-	-0-	$ 432,764	Total

Notes:

1. Cols. 2-4. Sales were estimated from Market Area Data
2. Cols. 5-7. The average rates required to produce an annual revenue sufficient to pay all operation, maintenance and overhead expenses; provide a fund for replacement; repay the investment in the electric plant with interest @ 3 percent are shown below:
   - Firm Energy . . . . . 5.5 Mills per kilowatthour
   - Non-Firm Energy . . . 3.5 Mills per kilowatthour
3. Col. 8. Operation, maintenance and overhead were estimated as follows:

Arkansas Power Canal	$109,030
Transmission Lines and Substations	62,280
Power Plants and Penstocks	413,480
Allocation of Joint Facilities	1,800
	$586,590

4. Col. 9. Requirements for provision for replacement were estimated as follows:

F.P.C. Acct. No.	Item of Property	Total
321	Structures and Improvements	$ 14,780
322	Reservoirs, Dams, Waterways, and Penstocks	11,870
323-325	Water Wheels, Generators, and Misc. Acc.	82,300
343	Switchyards and Substations	91,360
371	General Plant	3,110
345-346	Transmission Lines	52,150
		$255,570

5. Col. 14. The total estimated electric plant investment is determined as follows:

Investments	Total
Hunter Creek-Aspen Canal	$ 285,000
Replacement Reservoir - Aspen	8,325,000
Collection System	31,597,000
Fryingpan-Arkansas Tunnel	10,379,000
Sugar Loaf Reservoir	7,447,000
Snowden Diversion Canal	786,000
Twin Lakes Reservoir	10,503,000
Arkansas Power Canal:	
Elbert Canal	1,729,000
Twin Lakes-Otero Canal	1,595,000
Otero-Wapaco Canal	2,151,000
Wapaco-Princeton Canal	2,693,000
Princeton-Pancho Canal	2,085,000
Pancho-Salida Canal	2,465,000
Salida Afterbay	318,000
Pueblo Reservoir	44,648,000
Powerplants and Penstocks	19,786,000
Transmission System	7,312,000
General Property	1,204,000
Municipal Water Facilities	22,124,000
	$177,432,000
Investment fully reimbursable from power revenues	$42,043,000

ANALYSIS OF 59-YEAR RATE DETERMINATION STUDY

Components of Production Costs	Average Production Costs: Annual Saleable energy (455,700,000 KWH) Total annual costs	Per KWH	Firm energy (360,200,000 KWH) Annual cost	Per KWH	Secondary or Non-firm energy (95,500,000 KWH) Annual cost	Per KWH
Operating Costs						
Col. 8 Operation & Maintenance	$ 569,333	$ .00125				
Col. 9 Provision for Replace.	247,742	.00054				
Fixed Costs						
Col. 13 Payment to Principal	712,593	.00156				
Col. 12 Payment to Interest	778,397	.00171				
Surplus						
Col. 17 Earned Surplus	7,335	.00002				
Total	$2,315,400	$ .00508	$1,981,091	$ .0055	$ 334,309	$ .0035

ELECTRICAL GENERATION AND SALES AFTER DEVELOPMENT PERIOD

Power Plant	Average Annual Generation millions of Kilowatthours: Total	Firm	Secondary or Non-Firm	Average Annual Saleable Energy millions of Kilowatthours: Total	Firm	Secondary or Non-Firm
Elbert	39.0	26.3	12.7	36.1	24.3	11.8
Granite	66.8	48.8	18.0	61.8	45.1	16.7
Wapaco	125.9	100.4	25.5	116.5	92.9	23.6
Princeton	68.5	55.2	13.3	63.4	51.1	12.3
Johnson	69.4	55.0	14.4	64.2	50.9	13.3
Salida	102.4	81.3	21.1	94.7	75.2	19.5
Pueblo	33.0	33.0	0.0	30.5	30.5	0.0
Total	505.0	400.0	105.0	467.2	370.0	97.2

TABLE 9
FRYINGPAN-ARKANSAS PROJECT
POWER SYSTEM AVERAGE RATE DETERMINATION STUDY

Assumed amortization of Power investment in 50 years following development period, interest at 2½%

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Year of Study	Sales of electric energy millions of Kilowatthours			Operating Revenues Sales of electric energy			Revenue deductions			Net operating revenues	Income deductions Repayment of investment		Investment repayment from power revenues Plant in service at end of year			Earned Surplus Cumulative	Year of Study
	Firm	Non-Firm	Total Cols. 2 & 3	Firm 5.2 mills	Non-Firm 3.5 mills	Total Cols. 5 & 6	Operation Maintenance & Overhead	Provision for replacement	Total Cols. 8 & 9	Cols. 7-10	Interest 2½%	Principal	Interest bearing Electric plant	Balance to be repaid	Allowable unpaid balance		
0													$20,864,000		$20,864,000		0
1	177.2	45.1	222.3	$ 921,440	$ 157,850	$1,079,290	$ 269,380	$ 134,080	$ 403,460	$ 675,830	$ 521,600	$ 154,230	27,482,000	$27,327,770	27,482,000	-0-	1
2	222.3	61.8	284.1	1,155,960	216,300	1,372,260	358,270	183,320	541,590	830,670	683,194	147,476	33,907,000	33,605,294	33,907,000		2
3	315.2	85.4	400.6	1,639,040	298,900	1,937,940	451,050	224,700	675,760	1,262,190	840,132	422,058	38,067,000	37,343,236	38,067,000		3
4	339.5	97.2	436.7	1,765,400	340,200	2,105,600	530,410	249,720	780,130	1,325,470	933,581	391,889	38,067,000	36,951,347	38,067,000		4
5	339.5	97.2	436.7	1,765,400	340,200	2,105,600	530,410	249,720	780,130	1,325,470	923,784	401,686	38,067,000	36,549,661	38,067,000		5
6	339.5	97.2	436.7	1,765,400	340,200	2,105,600	530,410	249,720	780,130	1,325,470	913,742	411,728	38,067,000	36,137,933	38,067,000		6
7	339.5	97.2	436.7	1,765,400	340,200	2,105,600	530,410	249,720	780,130	1,325,470	903,448	422,022	38,067,000	35,715,911	38,067,000		7
8	339.5	97.2	436.7	1,765,400	340,200	2,105,600	530,410	249,720	780,130	1,325,470	892,898	432,572	38,067,000	35,283,339	38,067,000		8
9	339.5	97.2	436.7	1,765,400	340,200	2,105,600	530,410	249,720	780,130	1,325,470	882,083	443,387	42,043,000	38,815,952	42,043,000		9
10	370.0	97.2	467.2	1,924,000	340,200	2,264,200	586,590	284,210	870,800	1,393,400	970,399	423,001		38,392,951			10
11											959,824	433,576		37,959,375			11
12											948,984	444,416		37,514,959			12
13											937,874	455,526		37,059,433			13
14											926,486	466,914		36,592,519			14
15											914,813	478,587		36,113,932			15
16											902,848	490,552		35,623,380			16
17											890,585	502,815		35,120,565			17
18											878,014	515,386		34,605,179			18
19											865,129	528,271		34,076,908			19
20											851,923	541,477		33,535,431			20
21											838,386	555,014		32,980,417			21
22											824,510	568,890		32,411,527			22
23											810,288	583,112		31,828,415			23
24											795,710	597,690		31,230,725			24
25											780,768	612,632		30,618,093			25
26											765,452	627,948		29,990,145			26
27											749,754	643,646		29,346,499			27
28											733,662	659,738		28,686,761			28
29											717,169	676,231		28,010,530			29
30											700,263	693,137		27,317,393			30
31											682,935	710,465		26,606,928			31
32											665,173	728,227		25,878,701			32
33											646,968	746,432		25,132,269			33
34											628,307	765,093		24,367,176			34
35											609,179	784,221		23,582,955			35
36											589,574	803,826		22,779,129			36
37											569,478	823,922		21,955,207			37
38											548,880	844,520		21,110,687			38
39											527,767	865,633		20,245,054			39
40											506,126	887,274		19,357,780			40
41											483,945	909,455		18,448,325			41
42											461,208	932,192		17,516,133			42
43											437,903	955,497		16,560,636			43
44											414,016	979,384		15,581,252			44
45											389,531	1,003,869		14,577,383			45
46											364,435	1,028,965		13,548,418			46
47											338,710	1,054,690		12,493,728			47
48											312,343	1,081,057		11,412,671			48
49											285,317	1,108,083		10,304,588			49
50											257,615	1,135,785		9,168,803	42,043,000		50
51											229,220	1,164,180		8,004,623	21,179,000		51
52											200,116	1,193,284		6,811,339	14,561,000		52
53											170,283	1,223,117		5,588,222	8,136,000		53
54											139,706	1,253,694		4,334,528	3,976,000		54
55											108,363	1,285,037		3,049,491	3,976,000		55
56											76,237	1,317,163		1,732,328	3,976,000		56
57											43,308	1,350,092		382,236	3,976,000	-0-	57
58											9,556	382,236		-0-	3,976,000	1,001,608	58
59	370.0	97.2	467.2	1,924,000	340,200	2,264,200	586,590	284,210	870,800	1,393,400	-0-	-0-	42,043,000	-0-	3,976,000	1,393,400	59
	21,251.7	5,635.5	26,887.2	$110,508,840	$19,724,250	$130,233,090	$33,590,660	$16,250,920	$49,841,580	$80,391,510	$35,953,502	$42,043,000	$42,043,000	-0-	-0-	$2,395,008	

Notes:

1. Cols. 2-4. Sales were estimated from Market Area Data.
2. Cols. 5-7. The average rates required to produce an annual revenue sufficient to pay all operation, maintenance, and overhead expenses; provide a fund for replacement and repay the investment in the electric plant with interest @2-1/2 percent.
   - Firm Energy. . . . . 5.2 mills per kilowatthour
   - Nonfirm Energy . . . 3.5 mills per kilowatthour
3. Col. 8. Operation, maintenance, and overhead were estimated as follows:

Arkansas Power Canal.	$109,030
Transmission lines and substations. . . .	62,280
Powerplants and penstocks	413,480
Allocation of joint facilities.	1,800
Total.	$586,590

4. Col. 9 Requirements for provision for replacement at 2-1/2 percent in 50 years were estimated as follows:

F.P.C. Acct. No.	Item of Property	Amount
321	Structures and improvements	$ 17,920
322	Reservoirs, dams, waterways and penstocks	13,400
323-325	Water wheels, generators & miscellaneous acc.	129,490
343	Switchyards and substations	60,040
371	General plant	3,770
345-346	Tranamission lines	58,950
	Allocation of joint facilities	640
		$284,210

5. Col. 14 The total estimated electric plant investment is determined as follows:

Investments	Amounts
Hunter Creek-Aspen Canal.	$ 285,000
Replacement Reservoir - Aspen	8,325,000
Fryingpan Collection System	31,597,000
Fryingpan-Arkansas Tunnel	10,379,000
Sugar Loaf Reservoir.	7,447,000
Snowden Diversion Canal	786,000
Twin Lakes Reservoir.	10,503,000
Arkansas Power Canals:	
Elbert Canal.	1,729,000
Twin Lakes-Otero Canal.	1,595,000
Otero-Wapaco Canal.	2,151,000
Wapaco-Princeton Canal.	2,693,000
Princeton-Pancho Canal.	2,085,000
Pancho-Salida Canal	2,465,000
Salida Afterbay.	318,000
Pueblo Reservoir.	44,648,000
Powerplants and penstocks	19,786,000
Transmission system	7,312,000
Municipal water facilities.	22,124,000
General property.	1,204,000
Total.	$177,432,000
Investment fully reimbursable from power revenues . . .	$ 42,043,000

ANALYSIS OF 59-YEAR RATE DETERMINATION STUDY

Components of Production Costs	Average Production Costs: Annual Saleable energy (455,700,000 KWH) Total annual costs	Per KWH	Firm energy (360,200,000 KWH) Annual cost	Per KWH	Secondary or Non-Firm energy (95,500,000 KWH) Annual cost	Per KWH
Operating Costs						
Col. 8 Operation & Maintenance	$ 569,333	$ .00125				
Col. 9 Provision for Replace.	275,439	.00060				
Fixed Costs						
Col. 13 Payment to Principal	712,593	.00156				
Col. 12 Payment to Interest	609,381	.00134				
Surplus						
Col. 17 Earned Surplus	40,593	.00009				
Total	$2,207,339	$ .00484	$1,873,031	$ .0052	$334,309	$ .0035

ELECTRICAL GENERATION AND SALES AFTER DEVELOPMENT PERIOD

Power Plant	Average Annual Generation millions of Kilowatthours: Total	Firm	Secondary or Non-Firm	Average Annual Saleable Energy millions of Kilowatthours: Total	Firm	Secondary or Non-Firm
Elbert	39.0	26.3	12.7	36.1	24.3	11.8
Granite	66.8	48.8	18.0	61.8	45.1	16.7
Wapaco	125.9	100.4	25.5	116.5	92.9	23.6
Princeton	68.5	55.2	13.3	63.4	51.1	12.3
Johnson	69.4	55.0	14.4	64.2	50.9	13.3
Salida	102.4	81.3	21.1	94.7	75.2	19.5
Pueblo	33.0	33.0	0.0	30.5	30.5	0.0
Total	505.0	400.0	105.0	467.2	370.0	97.2

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TABLE 10
Analysis Without Project Constructed Transmission Facilities
FRYINGPAN-ARKANSAS PROJECT
Segregation of Costs

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

Feature	October 1953 Construction Costs					Annual Operation, Maintenance and Replacement					
	Total	Specific Costs			Joint costs	Total			Specific O.M. & R.		Joint O.M. & R.
		Power	Municipal Water Supply	Fish and Wildlife a/		O. & M.	2-1/2% - 50-years Replacement	O.M. & R.	Power	Municipal water	
Aspen Dam and Reservoir	$ 8,325,000				8,325,000	2,000	1,880	3,880			3,880
Sugar Loaf Dam and Reservoir	7,447,000				7,447,000	2,760	1,680	4,440			4,440
Twin Lakes Dam and Reservoir	10,503,000				10,503,000	3,900	2,370	6,270			6,270
Salida Afterbay	318,000	318,000				1,870	70	1,940	1,940		
Pueblo Dam and Reservoir	44,648,000				44,648,000	6,200	10,090	16,290			16,290
Main Purification Plant	7,390,000		7,390,000			33,750	10,290	44,040		44,040	
Pueblo Pumping Plant	1,520,000		1,520,000			93,320	18,340	111,660		111,660	
Colorado Springs Pumping Plant	160,000		160,000			4,780	1,930	6,710		6,710	
Hunter Creek-Aspen Canal	285,000				285,000	2,150	70	2,220			2,220
Hunter Creek Extension Canal	402,000			402,000		4,700	90	4,790			4,790
South Side Collection System	9,508,000			818,000	8,690,000	2,800		2,800			2,800
North Side Collection System	21,687,000			390,000	21,297,000	29,530	940	30,470			30,470
Fryingpan-Arkansas Tunnel	10,379,000			1,266,000	9,113,000	3,030		3,030			3,030
Snowden Canal	786,000				786,000	7,000	180	7,180			7,180
Arkansas Power Canal:											
Elbert Canal	1,729,000	1,729,000				26,250	410	26,660	26,660		
Twin Lakes-Otero Canal	1,595,000	1,595,000				11,460	380	11,840	11,840		
Otero-Wapaco Canal	2,151,000	2,151,000				15,470	510	15,980	15,980		
Wapaco Diversion	269,000	269,000				1,990	60	2,050	2,050		
Wapaco-Princeton Canal	2,424,000	2,424,000				18,370	570	18,940	18,940		
Chalk Creek Diversion	96,000	96,000				720	20	740	740		
Princeton-Pancho Canal	1,989,000	1,989,000				15,100	470	15,570	15,570		
Pancho-Salida Canal	2,465,000	2,465,000				17,800	580	18,380	18,380		
Oil Creek-Brush Hollow Canal	360,000		360,000			4,390	80	4,470		4,470	
Pueblo Water Conduit	1,781,000		1,781,000			26,020	7,810	33,830		33,830	
Arkansas Valley Water Conduit	10,913,000		10,913,000			159,460	47,840	207,300		207,300	
Powerplants	15,411,000	15,411,000				378,540	161,510	540,050	540,050		
Powerplant Switchyards	4,375,000	4,375,000				34,940	39,030	73,970	73,970		
Transmission Lines b/	1,020,000	1,020,000				4,880	11,840	16,720	16,720		
Transmission Substations b/	392,000	392,000				2,630	3,940	6,570	6,570		
General Property	1,204,000				1,204,000						
TOTALS	171,532,000	34,234,000	22,124,000	2,876,000	112,298,000	915,810	322,980	1,238,790	749,410	408,010	81,370

a/ These amounts represent the costs of enlargement of the collection and diversion system specifically for fish and wildlife purposes. It is shown as a specific cost because the allocation to this function is limited to the costs of these added facilities totalling $2,876,000 as described in report of the Regional Director for mitigation of losses.

b/ Salida-Gunnison transmission line and Salida and Gunnison substations constructed in connection with CBT Project to be ultimately charged to Fryingpan-Arkansas Project

Allocation of Costs

Purpose	Construction Costs	Annual O.M.&R.	Interest during Construction
Municipal Water	$ 33,129,000	$ 420,220	$1,189,000
Irrigation	78,272,000	67,000	3,415,000
Power	36,143,000	751,580	1,146,000
Flood Control	21,112,000	-0-	921,000
Fish and Wildlife	2,876,000	-0-	-0-
Total	$171,532,000	$1,238,800	$6,671,000

TABLE 11
FINANCIAL STUDY NO. 3
FRYINGPAN-ARKANSAS PROJECT
(Based on October 1953 construction prices. Repayment of power and municipal water investments with interest at 2-1/2 percent on the unpaid balance.
Project facilities as shown in the planning report except for elimination of transmission facilities.)

December 1953
Accompanies
letter of Nov. 10, 1953
from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	
	POWER						MUNICIPAL AND INDUSTRIAL WATER SUPPLY							IRRIGATION				RECAPITULATION		
Year of Study	Net operating revenues	Repayable Components of net power revenues		Investment Repayment			Gross revenues from municipal & industrial water supply	Annual operation, maintenance & replacement costs	Net revenues from municipal and industrial water plant	Repayment Components of net revenues		Investment repayment of municipal and industrial water plant	Irrigation plant paid by municipal water revenues	Gross irrigation revenues	Annual operation maintenance & replacement costs	Net revenues (including Conservancy District Tax)	Investment repayment Interest free balance to be repaid	Net project revenues	Earned surplus (cumulative)	Year of Study
		Interest 2-1/2%	Excess over interest	Interest Bearing: Electric plant	Interest Bearing: Balance to be repaid	Interest Free: Irrigation plant paid by power revenues				Interest 2-1/2%	Excess over interest									
0				$18,644,500		$27,847,000						$13,898,000	$6,885,000				$43,540,000			0
1	$ 653,860	$ 466,113	$ 187,747	24,237,800	$24,050,053		$ 758,430	$ 167,000	$ 591,430	$ 347,430	$ 243,980	13,654,020		$ 689,000	$ 67,000	$ 622,000	42,918,000	$ 1,867,290	-0-	1
2	808,030	601,251	206,779	29,831,200	29,436,674		758,430	167,000	591,430	341,350	250,080	13,403,940					42,296,000	2,021,460		2
3	1,215,020	735,917	479,103	33,560,100	32,686,471		758,430	167,000	591,430	335,098	256,332	13,147,608					41,674,000	2,428,450		3
4	1,281,540	817,162	464,378	33,560,100	32,222,093		758,430	167,000	591,430	328,690	262,740	12,884,868					41,052,000	2,494,970		4
5	1,281,540	805,552	475,988	33,560,100	31,746,105		758,430	167,000	591,430	322,122	269,308	16,830,560					40,430,000	2,494,970		5
6	1,281,540	793,653	487,887	33,560,100	31,258,218		939,940	225,240	714,700	422,014	292,686	16,587,874					39,808,000	2,618,240		6
7	1,281,540	781,455	500,085	33,560,100	30,758,133		939,940	225,240	714,700	414,697	300,003	16,287,871					39,186,000	2,618,240		7
8	1,281,540	768,953	512,587	33,560,100	30,245,546		939,940	225,240	714,700	407,197	307,503	15,980,368					38,564,000	2,618,240		8
9	1,281,540	756,139	525,401	37,289,000	33,449,045		939,940	225,240	714,700	399,509	315,191	15,665,177					37,942,000	2,618,240		9
10	1,349,620	836,226	513,394		32,935,651		939,940	225,240	714,700	391,629	323,071	23,686,106					37,320,000	2,686,320		10
11		823,391	526,229		32,409,422		1,338,330	339,190	899,140	592,153	306,987	28,757,119					36,698,000	2,870,760		11
12		810,236	539,384		31,870,038		1,427,740	412,620	1,015,120	718,928	296,192	28,460,927					36,076,000	2,986,740		12
13		796,750	552,870		31,317,168		1,427,740	412,620	1,015,120	711,523	303,597	30,590,330					35,454,000	2,986,740		13
14		782,929	566,691		30,750,477		1,484,410	420,220	1,064,190	764,758	299,432	30,290,898					34,832,000	3,035,810		14
15		768,762	580,858		30,169,619					757,272	306,918	29,983,980					34,210,000			15
16		754,240	595,380		29,574,239					749,600	314,590	29,669,390					33,588,000			16
17		739,356	610,264		28,963,975					741,735	322,455	29,346,935					32,966,000			17
18		724,099	625,521		28,338,454					733,673	330,517	29,016,418					32,344,000			18
19		708,461	641,159		27,697,295					725,410	338,780	28,677,638					31,722,000			19
20		692,432	657,188		27,040,107					716,941	347,249	28,330,389					31,100,000			20
21		676,003	673,617		26,366,490					708,260	355,930	27,974,459					30,478,000			21
22		659,162	690,458		25,676,032					699,361	364,829	27,609,630					29,856,000			22
23		641,901	707,719		24,968,313					690,241	373,949	27,235,681					29,234,000			23
24		624,208	725,412		24,242,901					680,892	383,298	26,852,383					28,612,000			24
25		606,073	743,547		23,499,354					671,310	392,880	26,459,503					27,990,000			25
26		587,484	762,136		22,737,218					661,488	402,702	26,056,801					27,368,000			26
27		568,430	781,190		21,956,028					651,420	412,770	25,644,031					26,746,000			27
28		548,911	800,709		21,155,319					641,101	423,089	25,220,942					26,124,000			28
29		528,883	820,737		20,334,582					630,524	433,666	24,787,276					25,502,000			29
30		508,365	841,255		19,493,327					619,682	444,508	24,342,768					24,880,000			30
31		487,333	862,287		18,631,040					608,569	455,621	23,887,147					24,258,000			31
32		465,776	883,844		17,747,196					597,179	467,011	23,420,136					23,636,000			32
33		443,680	905,940		16,841,256					585,503	478,687	22,941,449					23,014,000			33
34		421,031	928,589		15,912,667					573,536	490,654	22,450,795					22,392,000			34
35		397,817	951,803		14,960,864					561,270	502,920	21,947,875					21,770,000			35
36		374,022	975,598		13,985,266					548,697	515,493	21,432,382					21,148,000			36
37		349,632	999,988		12,985,278					535,810	528,380	20,904,002					20,526,000			37
38		324,632	1,024,988		11,960,290					522,600	541,590	20,362,412					19,904,000			38
39		299,007	1,050,613		10,909,677					509,060	555,130	19,807,282					19,282,000			39
40		272,742	1,076,878		9,832,799					495,182	569,008	19,238,274					18,660,000			40
41		245,820	1,103,800		8,728,999					480,957	583,233	18,655,041					18,038,000			41
42		218,225	1,131,395		7,597,604					466,376	597,814	18,057,227					17,416,000			42
43		189,940	1,159,680		6,437,924					451,431	612,759	17,444,468					16,794,000			43
44		160,948	1,188,672		5,249,252					436,112	628,078	16,816,390					16,174,000			44
45		131,231	1,218,389		4,030,863					420,410	643,780	16,172,610					15,554,000			45
46		100,772	1,248,848		2,782,015					404,315	659,875	15,512,735					14,934,000			46
47		69,550	1,280,070		1,501,945					387,818	676,372	14,836,363					14,306,000			47
48		37,549	1,312,071		189,874	27,847,000				370,909	693,281	14,143,082					13,681,000			48
49		4,747	189,874		-0-	26,692,001				353,577	710,613	13,432,469					13,062,000			49
50		-0-	-0-			25,342,381				335,812	728,378	12,704,091					12,446,000			50
51						23,992,769				317,602	746,588	11,957,503					11,838,000			51
52						22,643,141				298,938	765,252	11,192,251					11,226,000			52
53						21,293,521				279,806	784,384	10,407,867					10,571,000			53
54						19,943,901				260,197	803,993	9,603,874					9,952,000			54
55						18,594,281				240,097	824,093	8,779,781					9,330,000			55
56						17,244,661				219,495	844,695	7,935,086					8,708,000			56
57						15,895,041				198,377	865,813	7,069,273					8,086,000			57
58						14,545,421				176,732	887,458	6,181,815					7,464,000			58
59						13,195,801				154,545	909,645	5,272,170					6,842,000			59
60						11,846,181				131,804	932,386	4,339,784					6,220,000			60
61						10,496,561				108,495	955,695	3,384,089					5,598,000			61
62						9,146,941				84,602	979,588	2,404,501					4,976,000			62
63						7,797,321				60,113	1,004,077	1,400,424	6,885,000				4,354,000			63
64						6,447,701				35,011	1,029,179	371,245	6,885,000				3,732,000			64
65						5,098,081				9,281	371,245	-0-	6,201,336				3,110,000			65
66						3,748,461				-0-	-0-		5,137,146				2,488,000			66
67						2,399,841							4,072,956				1,866,000			67
68						1,049,221							3,008,766				1,244,000			68
69						-0-			1,064,190				1,944,576				622,000		-0-	69
70						-0-	1,484,410		1,064,190				880,386	689,000	67,000	622,000	-0-		300,399	70
71	1,349,620	-0-	-0-	37,289,000	-0-		1,300,606	420,220	880,386				-0-					3,035,810	1,650,019	71
																		2,230,006	2,999,639	
Total	$94,042,590	$25,906,951	$37,289,000	$37,289,000	-0-	-0-	$98,497,636	$27,498,390	$70,999,246	$29,796,246	$34,314,000	$ -0-	$6,885,000	$48,230,000	$4,690,000	$43,540,000	-0-	$208,581,836	$2,999,639	

SUMMARY OF COST ALLOCATIONS AND REPAYMENT

Total project construction cost	$171,532,000	
Interest during construction	6,671,000	
Total project investment	$178,203,000	
Less nonreimbursable costs:		
Flood control	$ 21,112,000	
Fish and wildlife conservation	2,876,000	
Interest during construction	4,336,000	
Balance reimbursable	$149,879,000	
2-1/2 percent interest bearing allocations:		
Commercial power:		
Construction costs	$ 36,143,000	
Interest during construction	1,146,000	
Allocation		37,289,000
Municipal and industrial water:		
Construction costs	$ 33,129,000	
Interest during construction	1,189,000	
Allocation		34,318,000
Non-interest bearing allocations:		
Irrigation		78,272,000
Total		$149,879,000

Repayment of irrigation costs:	
By Conservancy District	$43,540,000
By power revenues	27,847,000
By municipal and industrial water revenues	6,885,000
Total	$78,272,000

SOURCE OF IRRIGATION REVENUES

Service	Water delivery acre-foot	Rate	Gross Revenue
Sale of project water	56,700	$5.40	$306,180
Storage and regulation of Twin Lakes Company diversions	12,500	3.00	37,500
Regulation of winter water	74,000	2.25	166,500
District tax (1 mill levy - 10% administrative cost)			178,475
Total gross annual revenue			$688,655

SOURCE OF MUNICIPAL WATER REVENUES DURING REPAYMENT PERIOD

Unit or Service	Price per acre-foot water	Years 1 to 5 of payout period: Water sold acre-foot	Years 1 to 5: Gross revenue	Years 6 to 10 of payout period: Water sold acre-foot	Years 6 to 10: Gross revenue	Year 11 of payout period: Water sold acre-foot	Year 11: Gross revenue	Years 12 and 13 of payout period: Water sold acre-foot	Years 12 and 13: Gross revenue	Year 14 to end of payout period: Water sold acre-foot	Year 14 to end: Gross revenue
Colorado Springs	$ 39.05	2,700	$105,430	2,700	$105,430	2,700	$ 105,430	2,700	$ 105,430	2,700	$ 105,430
Pueblo											
Storage of Wurts Ditch water	23.50	2,000	47,000	2,000	47,000	2,000	47,000	2,000	47,000	2,000	47,000
Improved quality present supply	22.50	21,000	472,500	21,000	472,500	21,000	472,500	21,000	472,500	21,000	472,500
Project water	41.50	3,000	124,500	3,000	124,500	3,000	124,500	3,000	124,500	3,000	124,500
Valley towns											
Trunk line deliveries	88.10	11	1,000	1,748	154,030	5,124	452,420	7,274	640,840	7,274	640,840
Crowley branch line	147.50							7	990	96	14,160
Kads branch line	255.90									170	43,500
Colo. Fuel & Iron Corporation Improved supply	2.00	4,000	8,000	4,000	8,000	4,000	8,000	4,000	8,000	4,000	8,000
Water held for future demand	22.60			1,260	28,480	1,260	28,480	1,260	28,480	1,260	28,480
Totals		32,711	$758,430	35,708	$939,940	39,084	$1,238,330	41,241	$1,427,740	41,500	$1,484,410

TABLE 12
FRYINGPAN-ARKANSAS PROJECT
POWER SYSTEM AVERAGE RATE AND REPAYMENT STUDY NO. 3A
TRANSMISSION FACILITIES ELIMINATED

(Construction costs at October 1953 price levels. Power rates 4.6 mills per kwh for firm energy and 3.0 mills per kwh for secondary energy. Interest rate 2-1/2 percent.)

December 1953
Accompanies reply to
letter of Nov. 10, 1953
from John P. Saylor, M.C.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Year of Study	Sales of electric energy millions of kilowatthours at powerplant switchyard			Operating revenue Sales of electric energy			Revenue deductions			Net operating revenues	Income deductions Repayment of investment		Investment repayment from power revenues plant in service at end of year						Earned surplus cumulative	Year of Study
													Interest bearing		Interest free		Allowable unpaid balance			
	Firm	Non-firm	Total Cols. 2 & 3	Firm 4.6 mills	Non-firm 3.0 mills	Total Cols. 5 & 6	Operation, maintenance & overhead	Provision for replacement	Total Cols. 8 & 9	Cols. 7-10	Interest 2-1/2%	Principal	Electric plant	Balance to be repaid	Irrigation plant	Balance to be repaid	Electric plant	Irrigation plant		
0													$ 18,644,500		$ 27,847,000		$ 18,644,500	$ 27,847,000		0
1	186.8	47.5	234.3	$ 859,280	$ 142,500	$ 1,001,780	$ 244,520	$ 103,400	$ 347,920	$ 653,860	$ 466,113	$ 187,747	24,237,800	$24,050,053		$27,847,000	24,237,800		-0-	1
2	234.3	65.1	299.4	1,077,780	195,300	1,273,080	324,250	140,800	465,050	808,030	601,251	206,779	29,831,200	29,436,674			29,831,200			2
3	332.2	90.0	422.2	1,528,120	270,000	1,798,120	409,300	173,800	583,100	1,215,020	735,917	479,103	33,560,100	32,686,471			33,560,100			3
4	357.9	102.4	460.3	1,646,340	307,200	1,953,540	478,400	193,600	672,000	1,281,540	817,162	464,378		32,222,093						4
5											805,552	475,988		31,746,105						5
6											793,653	487,887		31,258,218						6
7											781,455	500,085		30,758,133						7
8											768,953	512,587	33,560,100	30,245,546			33,560,100			8
9	357.9		460.3	1,646,340		1,953,540	478,400	193,600	672,000	1,281,540	756,139	525,401	37,289,000	33,449,045			37,289,000			9
10	390.0	102.4	492.4	1,794,000	307,200	2,101,200	531,560	220,020	751,580	1,349,620	836,226	513,394		32,935,651						10
11											823,391	526,229		32,409,422						11
12											810,236	539,384		31,870,038						12
13											796,750	552,870		31,317,168						13
14											782,929	566,691		30,750,477						14
15											768,762	580,858		30,169,619						15
16											754,240	595,380		29,574,239						16
17											739,356	610,264		28,963,975						17
18											724,099	625,521		28,338,454						18
19											708,461	641,159		27,697,295						19
20											692,432	657,188		27,040,107						20
21											676,003	673,617		26,366,490						21
22											659,162	690,458		25,676,032						22
23											641,901	707,719		24,968,313						23
24											624,208	725,412		24,242,901						24
25											606,073	743,547		23,499,354						25
26											587,484	762,136		22,737,218						26
27											568,430	781,190		21,956,028						27
28											548,911	800,709		21,155,319						28
29											528,883	820,737		20,334,582						29
30											508,365	841,255		19,493,327						30
31											487,333	862,287		18,631,040						31
32											465,776	883,844		17,747,196						32
33											443,680	905,940		16,841,256						33
34											421,031	928,589		15,912,667						34
35											397,817	951,803		14,960,864						35
36											374,022	975,598		13,985,266						36
37											349,632	999,988		12,985,278						37
38											324,632	1,024,988		11,960,290						38
39											299,007	1,050,613		10,909,677						39
40											272,742	1,076,878		9,832,799						40
41											245,820	1,103,800		8,728,999						41
42											218,225	1,131,395		7,597,604						42
43											189,940	1,159,680		6,437,924						43
44											160,948	1,188,672		5,249,252						44
45											131,231	1,218,389		4,030,863						45
46											100,772	1,248,848		2,782,015						46
47											69,550	1,280,070		1,501,945						47
48											37,549	1,312,071		189,874		27,847,000				48
49											4,747	189,874		-0-		26,692,001				49
50											-0-	-0-				25,342,381	37,289,000			50
51																23,992,769	18,644,500			51
52																22,643,141	13,051,200			52
53																21,293,521	7,457,800			53
54																19,943,901	3,728,900			54
55																18,594,281	3,728,900			55
56																17,244,661	3,728,900			56
57																15,895,041	3,728,900			57
58																14,545,421	3,728,900			58
59																13,195,801	3,728,900			59
60																11,846,181	-0-			60
61																10,496,561				61
62																9,146,941				62
63																7,797,321				63
64																6,447,701				64
65																5,098,081				65
66																3,748,461				66
67																2,398,841				67
68																1,049,221				68
69																-0-			-0-	69
70																			300,399	70
71	390.0	102.4	492.4	1,794,000	307,200	2,101,200	531,560	220,020	751,580	1,349,620	-0-	-0-	37,289,000	-0-	27,847,000	-0-	-0-	27,847,000	1,650,019	71
																		-0-	2,999,639	
Total	27,080.7	7,165.8	34,246.5	$124,571,220	$21,497,400	$146,068,620	$36,805,190	$15,220,840	$52,026,030	$94,042,590	$25,906,951	$37,289,000	$37,289,000	-0-	$27,847,000	-0-	-0-	-0-	$2,999,639	Total

Notes:

1. Cols. 2-4. Sales were estimated from Market Area Data.

2. Cols. 5-7. The average rates required to produce an annual revenue sufficient to pay all operation, maintenance, and overhead expenses; provide a fund for replacement; repay the investment in the electric plant with interest @ 2-1/2 percent; repay the portion of the investment in irrigation plant without interest are shown below:

   Firm Energy. . . . . 4.6 mills per kilowatthour
   Non-firm energy. . . 3.0 mills per kilowatthour

3. Col. 8 Operation, maintenance, and overhead were estimated as follows:

Arkansas Power Canal.	$109,030
Transmission lines and substations. . . .	7,510
Powerplants and penstocks	413,480
Allocation of joint facilities.	1,540
Total.	$531,560

4. Col. 9. Requirements for provision for replacement at 2-1/2 percent in 50 years were estimated as follows:

F.P.C. Acct. No.	Item of Property	Amount
321	Structures and improvements	$ 17,920
322	Reservoirs, dams, waterways & penstocks	13,400
323-325	Water wheels, generators & miscellaneous acc.	129,490
343	Switchyards and substations	42,970
371	General plant	3,770
345-346	Transmission lines	11,840
	Allocation of joint facilities	630
		$220,020

5. Col. 14. The total estimated electric plant investment is determined as follows:

Investments	Amounts
Hunter Creek-Aspen Canal.	$ 285,000
Replacement Reservoir - Aspen	8,325,000
Fryingpan Collection System	31,597,000
Fryingpan-Arkansas Tunnel	10,379,000
Sugar Loaf Reservoir.	7,447,000
Snowden Canal	786,000
Twin Lakes Reservoir.	10,503,000
Arkansas Power Canals:	
Elbert Canal.	1,729,000
Twin Lakes-Otero Canal.	1,595,000
Otero-Wapaco Canal.	2,151,000
Wapaco-Princeton Canal.	2,693,000
Princeton-Pancho Canal.	2,085,000
Pancho-Salida Canal	2,465,000
Salida Afterbay	318,000
Pueblo Reservoir.	44,648,000
Powerplants, penstocks, and switchyards	19,786,000
Transmission system	1,412,000
Municipal water facilities.	22,124,000
General property.	1,204,000
Interest during construction.	6,671,000
Total.	178,203,000

This investment was allocated as follows:

(1) Fully reimbursable from power revenues:	
(a) Construction costs.	$36,143,000
(b) Interest during construction.	1,146,000
	$37,289,000
(2) Partially reimbursable from power revenues:	
Irrigation investment	$78,272,000
Borne by Conservancy District	43,540,000
Borne by municipal water revenues	6,885,000
Borne by power revenues	$27,847,000
(3) Total reimbursable from power revenues:	$65,136,000
(4) Other allocated portions:	
Municipal water, project system	$33,129,000
Municipal water, interest during construction.	1,189,000
Municipal water, total.	34,318,000
Flood control	21,112,000
Fish and Wildlife	2,876,000
Nonreimbursable interest during construction.	4,336,000

December 11, 1953

| | | |

TABLE 14.—*Fryingpan-Arkansas project—Summary of benefit-cost analysis (October 1953 construction costs)*

Item	Total project	Municipal water	Irrigation	Power	Flood control	Fish and wildlife
	Evaluated over 100-year period—Interest at 2½ percent					
Public investment:						
Estimated construction cost	$177,432,000	$33,129,000	$78,272,000	$42,043,000	$21,112,000	$2,876,000
Interest during construction	6,837,000	1,189,000	3,319,000	1,312,000	895,000	122,000
Total	184,269,000	34,318,000	81,591,000	43,355,000	22,007,000	2,998,000
Annual costs:						
Equivalent of public investment	5,032,000	937,000	2,228,000	1,184,000	601,000	82,000
Operation, maintenance and replacement	1,358,000	420,000	67,000	871,000	----------	----------
Regulation by upper Colorado storage project	163,000	----------	----------	----------	----------	----------
Total	6,553,000	1,357,000	2,295,000	2,055,000	601,000	82,000
Annual benefits:						
Direct	[1] 6,701,000	1,662,000	1,598,000	2,702,000	598,000	----------
Indirect	2,757,000	----------	2,757,000	----------	----------	----------
Total	9,458,000	1,662,000	4,355,000	2,702,000	598,000	----------
Benefit-cost ratio:						
Total benefits	1.44	----------	1.90	----------	----------	----------
Direct benefits	1.02	1.22	.70	1.31	1.00	----------
	Evaluated over 50-year period—Interest at 2½ percent					
Public investment:						
Estimated construction cost	$177,432,000	$33,129,000	$78,272,000	$42,043,000	$21,112,000	$2,876,000
Interest during construction	6,837,000	1,189,000	3,319,000	1,312,000	895,000	122,000
Total	184,269,000	34,318,000	81,591,000	43,355,000	22,007,000	2,998,000
Annual costs:						
Equivalent of public investment	6,497,000	1,210,000	2,877,000	1,528,000	776,000	106,000
Operation, maintenance and replacement	1,358,000	420,000	67,000	871,000	----------	----------
Regulation by upper Colorado storage project	163,000	----------	----------	----------	----------	----------
Total	8,018,000	1,630,000	2,944,000	2,399,000	776,000	106,000
Annual benefits:						
Direct	[1] 6,701,000	1,662,000	1,598,000	2,702,000	598,000	----------
Indirect	2,757,000	----------	2,757,000	----------	----------	----------
Total	9,458,000	1,662,000	4,355,000	2,702,000	598,000	----------
Benefit-cost ratio:						
Total benefits	1.18	----------	1.48	----------	----------	----------
Direct benefits	.84	1.02	.54	1.13	0.77	----------

[1] Includes $141,000 benefits from sediment control.

EXHIBIT A

Letter from Mr. Charles J. Beise, attorney for the Water Development Association of Southeastern Colorado, to Mr. D. P. Ducy, president of the Water Development Association of Southeastern Colorado, dated December 11, 1953

THE WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO,
THE FRYINGPAN-ARKANSAS PROJECT,
December 11, 1953.

Mr. D. P. DUCY,
President, Water Development Association of Southern Colorado,
Pueblo, Colo.

DEAR DAMIAN: You have requested me to express my opinion as to what are the present prospects that the cities and towns of the Arkansas Valley will provide their own facilities in connection with the valley pipeline pumping and treatment plant for the supply of municipal water to valley towns.

It is impossible to presently determine whether or not the cities and towns of the valley can provide their required facilities by private finance. Your question poses a problem which is particularly subject to current conditions. Factors motivating in favor of private finance are that such facilities unquestionably could be constructed at a lower cost by private contractors and, probably most important of all, the cities and towns would enjoy far more freedom from governmental restriction if they are able to privately finance and construct their required facilities.

Enticing as private finance admittedly is, we cannot overlook other factors which motivate against such finance. These factors are primarily legal, operative, and financial. I mention them in that order. No construction of the Fryingpan project will commence until a water conservancy district has been organized and a repayment contract entered into between that district and the United States, obligating the district to repay to the United States the reimbursable portion of the project. The towns and cities of the Arkansas Valley who will derive municipal waters must be included in such district because there is a very grave legal doubt as to the right of a district to sell waters for such purposes outside of its boundaries. Accordingly, the United States will have a "first lien" on all project features under its contract with the district, and the failure of the district to meet its current obligations to the United States would result in the water supply for the municipal system being shut off. This, then, means that any private financing would have to be subordinated to the rights of the United States, that is, in effect we would be able only to offer to private finance the security of a system without a water right. It is doubtful if this would be satisfactory.

The possibility of creating a metropolitan water district poses also certain legal problems of overlapping entities which would be avoided if only a water conservancy district is used. The Conservancy District Act contains specific provisions for the sale of municipal water to towns and cities. The conservancy district offers far more flexibility than any other form of entity. The extent of participation of each town would be frozen at the outset if private finance were used, whereas, if Government funds are loaned to the conservancy district, such permits a city to increase its demand as necessities require and conditions change, whereas, if private finance is used it is doubtful if this can be accomplished. All all in all, I think the probabilities are that Federal financing of the valley pipeline and related features will be a necessity.

You have asked me what assurance we have that the conservancy district will pay 1 mill ad valorem tax. The Water Conservancy District Act contains such a specific provision empowering the board of directors of the district to levy such a tax on all real and personal property within the district boundaries, not in excess of one-half of 1 mill, prior to the time that the facilities are constructed and thereafter not in excess of 1 mill, unless default or deficiency occurs, in which event the maximum levy will be 1½ mills. This tax provision was challenged and its validity sustained by the Supreme Court of Colorado in connection with the Colorado-Big Thompson project. Thus, it is legally settled that the district will pay the 1 mill ad valorem tax. From a practical standpoint, the tax will be collected as illustrated by the fact that the assessed valuation of real and personal property in Pueblo County today is approximately $127 million and the current mill levy is 66½ mills. An addition of 1 mill will not create any difficulty.

You have asked what assurance we have that the water users will pay $5.40 per acre-foot of water. I remind you that an extensive survey was conducted during which some 263 farmers, considered to be characteristic of the farmers of the Arkansas Valley, were individually contacted and an economic analysis of their operations was made, and they themselves have determined that the charge of $5.40 is well within their repayment ability. It is my recollection that Mr. Roy D. Cooper, whose statement appears commencing at page 145, and Mr. Ted R. Ryan, whose statement appears commencing at page 148 of the hearings before the subcommittee of the House, specifically discussed this precise matter and submitted evidence to support their conclusion that the charge of $5.40 was reasonable and that the farmers were willing and able to pay this charge.

If you have any further questions, do not hesitate to contact me.

Very truly yours,

CHARLES J. BEISE,
Of Fairfield & Woods.

EXHIBIT B

Operation studies for Fryingpan-Arkansas project (extracted from U. S. Bureau of Reclamation January 1950 report)

EXPLANATION OF COLUMNS IN TABLE 45, RESERVOIR OPERATIONS (WATER UTILIZATION)

Column 3: Imports of Fryingpan diversion. Includes estimated average annual past diversion of 5,000 acre-feet through Busk-Ivanhoe Tunnel.

Column 4: Record and completion of record by correlation of Lake Fork of Arkansas River at outlet of Sugar Loaf Reservoir adjusted to eliminate effects of historic regulations.

Column 5: Irrigation release for presently irrigated lands on Lake Fork—15 cubic feet per second of natural flow May through September.

Column 6: Fish flow of 5 cubic feet per second or natural flow of Lake Fork below Sugar Loaf Reservoir, October through April. Irrigation release estimated to be sufficient for fish flow during the irrigation season.

Column 7: Release to Elbert Canal for power at Elbert powerplant.

Column 8: Reservoir surface evaporation for 1 month.

Column 9: Content of Sugar Loaf Reservoir at end of month.

Column 10: Spills occur when reservoir content exceeds 117,000 acre-feet.

Column 12: Record and completion of record by correlation of Halfmoon Creek above interception canal near Malta.

Column 13: Spills occur when flow of Halfmoon Creek exceeds the capacity (100 cubic feet per second) of the interception canal after irrigation bypass. Water was bypassed in some instances to maintain fish flow at Snowden diversion.

Column 14: Irrigation bypass to equal 16 cubic feet per second decree or natural flow of Halfmoon Creek whichever is the smaller.

Column 15: Canal loss of 10 percent due to seepage, etc., from flows shown in columns 7, 12, 13, 14.

Column 16: Total of flows shown in columns 7 and 12 less spills and irrigation bypass (columns 13 and 14) less canal loss, column 15.

Column 17: Power generated from flow shown in column 16 through Elbert powerplant.

Column 19: Historic imports into the basin by the Fremont Pass, Wurtz, Ewing, and Columbine ditches.

Column 20: Record and completion of record by correlation of East and Tennessee Forks of Arkansas River plus runoff from intermediate areas of 38.3 and 56.8 square miles above Snowden diversion.

Column 21: Fish flow of 30 cubic feet per second or natural flow, whichever is the smaller.

Column 22: Available flow at Snowden diversion.

Column 24: Ultimate imports of Twin Lakes diversion.

Column 25: Record and completion of record by correlation of Lake Creek at outlet of Twin Lakes Reservoir adjusted to eliminate effects of historic regulation.

Column 26: Total inflow to Twin Lakes Reservoir.

Column 27: Release to maintain 66 cubic feet per second fish flow at Granite. Amount shown in this column is equal to 4,000 acre-feet (66 cubic feet per second), minus flows in columns 21 and 39.

Column 28: Release to Granite powerplant for power generation.

Column 29: Power derived from flow shown in column 28 through Granite powerplant.

Column 30: Reservoir surface evaporation for 1 month.

Column 31: Content of Twin Lakes Reservoir at end of month.

Column 32: Spills occur when reservoir content exceeds 260,000 acre-feet and when additional release in excess of 60,000 acre-feet in column 28 is made for shortages below Pueblo Reservoir.

Column 33: Spills occur when release in column 28 plus flow shown in columns 34 and 35 exceed canal capacity of 36,000 acre-feet (600 second-feet).

Column 34: Record and completion of record by correlation of Clear Creek at outlet of Clear Creek Reservoir adjusted to eliminate effects of historic regulation.

Column 35: Estimated runoff from an area of 37.4 square miles above the Clear Creek Canal.

Column 36: Total flow through Wapaco powerplant is equal to column 28 minus 33 plus 34 and 35.

Column 37: Power generated from flow shown in column 36 through Wapaco powerplant.

Column 39: Estimated runoff from an area of 79.9 square miles above the Granite gage.

Column 40: Estimated runoff from an area of 25.5 square miles between Granite gage and Wapaco interception.

Column 41: Fish flow of 66 cubic feet per second or natural flow whichever is the smaller.

Column 42: Net flow from Wapaco interception to Princeton powerplant.

Column 43: Estimated canal loss due to seepage and canal capacity between Wapaco powerplant and Princeton powerplant.

Column 44: Total flow through Princeton powerplant.

Column 45: Power generated from flow shown in column 44 through Princeton powerplant.

Column 47: Record and completion of record by correlation of Chalk Creek above the interception canal.

Column 48: Spills occur when flow of Chalk Creek exceeds the capacity (375 cubic feet per second) of the interception canal after irrigation and fish flows were bypassed.

Column 49: Irrigation bypass to equal 67 cubic feet per second decree or natural flow of Chalk Creek whichever is the smaller.

Column 50: Fish flows of 8 cubic feet per second or natural flow, whichever is the smaller, October through April. No fish release made during irrigation season. Irrigation release estimated to be sufficient for fish flow.

Column 51: Estimated canal loss due to seepage and canal capacity between Princeton and Johnson powerplants.

Column 52: Total flow through Johnson powerplant.

Column 53: Power generated from flow shown in column 52 through Johnson powerplant.

Column 55: Estimated canal loss due to seepage, etc., between Johnson and Salida powerplants.

Column 56: Total flow through Salida powerplant.

Column 57: Power generated from flow shown in column 56 through Salida powerplant.

Column 59: Record and completion of record by correlation of Cottonwood Creek below Hot Springs near Buena Vista.

Column 60: Estimated runoff from an area of 459.8 square miles between Granite and Salida gages.

Column 61: Accumulated fish flow is the sum of columns 41 and 50.

Column 62: Return of Chalk Creek spills shown in column 48.

Column 63: Inasmuch as all intermediate flows between Arkansas River gages were computed by the gain method, credit can be claimed for irrigation releases shown in column 49.

Column 64: Canal loss returns are the estimated losses shown in columns 33, 43, 51 and 55.

Column 66: Project operation flow to Salida gage is the sum of columns 32, 56 and 59 through 64.

Column 67: Recorded runoff of the Arkansas River at the Salida gage.

RESERVOIR OPERATION

	Winter storage Arkansas R. water released	Project supplemental irr. water released	Independence Pass water released	Total release thru Pueblo Power Plant	Historical Reservoir Ditch Rivr. released	Valley municipal water release	Power generated at Pueblo Power Plant	Reservoir evaporation	Reservoir content end of month	Project water spills	Winter Arkansas River water spills		Total power generated at all Power Plants	Flood Clare stored		Pre-Project Headgate shortage
	(74) 82/	(75)	(76)	(77)	(78) 84/	(79) 84/	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)
									2.0							
	.0	0	0	15.3	1.7	1.1	0	0	12.1				341			0
	0	0	0	3.1	0	0.9	0	0.2	14.4				33.5			0
	0	0	0	2.2	0	1.0	0.2	0.2	28.3				33.8			0
	0	0	0	2.0	0	1.0	0.2	0.2	110.2				32.9			0
	0	0	0	1.9	0	0.9	0.2	0.3	156.6				33.6			0
	0	0	0	2.0	0	1.1	0.2	0.4	206.4				33.7			0
	63.2	0	12.0	83.4	3.6	1.2	7.9	0.7	144.1				34.2			63.2
	24.8	63.1	23.0	178.6	4.5	1.4	7.9	1.0	25.4				33.7			183.1
	0	0	10.0	144.1	13.6	1.6	0	0.5	2.8				61.1			13.4
	0	0	0	138.9	19.0	1.7	0	0.1	0.8				38.5			44.7
	0	0	0	62.2	3.7	1.6	0	0.1	0.3				34.2			17.2
	0	0	0	29.4	3.7	1.4	0	0.1	7.8				32.8			37.5
	110	63.1	49.0	667.3	58.9	15.0	16.6	4.0	—	0	0		578.2	0		708.2
	0	0	0	65.1	3.5	1.1	0	0.2	9.9				33.9			0
	0	0	0	9.3	0	0.9	0	0.1	48.6				33.8			0
	0	0	0	8.5	0	1.0	0.6	0.2	78.9				34.6			0
	0	0	0	7.5	0	1.0	0.8	0.3	123.2				58.3			0
	0	0	0	7.5	0	0.9	0.9	0.3	162.2				58.2			0
	0	0	0	7.6	0	1.1	1.0	0.4	2.29				56.2			0
	22.7	0	9.0	56.1	3.5	1.2	6.7	0.7	193.3				33.7			22.7
	60.3	44	16.0	153.8	8.2	1.4	7.9	1.3	167.4				66.7			66.4
	0	28.1	10.0	149.0	16.6	1.6	7.9	1.1	60.8				70.2			33.4
	0	33.7	12.0	134.1	16.0	1.8	7.9	0.9	1.7				30.3			52.8
	0	6.2	7.0	74.7	7.7	1.6	0	0.1	2.0				51.9			24.2
	0	0	0	25.0	3.6	1.4	0	0.1	12.2				32.7			2.3
	88.0	76.4	60.0	827.2	59.1	15.0	33.7	5.9	—	0	0		605.5	0		262.8
	0	0	0	42.5	1.7	1.1	0	0.3	20.9				34.0			0
	0	0	0	7.5	0	0.9	0	0.2	73.9				33.6			0
	0	0	0	2.6	0	1.0	0.8	0.2	100.6				34.7			0
	0	0	0	7.8	0	1.0	0.9	0.3	132.8				32.7			0
	0	0	0	2.7	0	0.9	1.0	0.3	157.6				28.0			0
	0	0	0	2.7	0	1.1	1.1	0.5	182.0				29.7			0
	11.3	0	7.0	45.2	3.6	1.2	5.2	0.8	168.0				31.0			11.3
	78.8	3.0	14.0	142.5	9.7	1.4	7.9	1.1	61.2				29.1			13.7
	0	21.0	22.0	133.0	13.5	1.6	7.9	0.8	1.2				61.8			32.5
	0	0	2.0	42.7	5.1	1.7	0	0.1	0.7				58.0			129.0
	0	0	0	23.5	4.6	1.6	0	0.1	7.6				37.3			142.7
	0	0	0	23.6	1.7	1.4	0	0.3	16.4				32.7			22.4
	90.1	24.0	47.0	570.1	33.0	15.0	24.8	4.9	—	0	0		462.8	0		441.3
	0	0	0	237	1.8	1.1	0	0.3	243				34.1			9.8
	0	0	0	7.3	0	0.9	0	0.2	50.2				33.6			0
	0	0	0	7.5	0	1.0	0.6	0.2	76.9				34.7			0
	0	0	0	7.5	0	1.0	0.7	0.3	126.7				55.8			0
	0	0	0	7.4	0	0.9	0.8	0.3	174.9				55.9			0
	0	0	0	7.4	0	1.1	0.8	0.4	2.22				55.8			0
	5.1	0	6.0	49.4	3.6	1.2	4.7	0.9	23.3				57.1			5.1
	21.1	0	0	102.9	14.6	1.4	7.7	1.0	20.3				57.8			21.7
	33.9	0	7.0	23.9	10.9	1.6	7.9	1.8	98.1				55.8			33.9
	17.1	0	7.0	24.5	18.8	1.8	7.7	1.3	31.6				57.0			17.1
	7.9	15.1	4.0	14.9	11.3	1.6	0	0.7	0.1				49.4			23.1
	0	0	3.0	25.2	3.6	1.4	0	0	5.8				32.6			0
	85.1	15.1	27.0	835.4	66.6	15.0	31.5	7.8	—	0	0		570.4	0		111.1
	0	0	4.0	36.5	1.8	1.1	0	0.1	10.2				33.9	0		0
	0	0	0	13.0	0	0.9	0	0.1	44.9				33.6	0		0
	0	0	0	13.1	0	1.0	0	0.2	72.7				34.6	0		0
	0	0	0	12.2	0	1.0	1.1	0.2	106.9				33.6	0		0
	0	0	0	12.9	0	0.9	1.2	0.2	130.0				28.9	0		0
	0	0	0	12.0	0	1.1	1.3	0.2	161.3				29.9	0		0
	1.4	0	0	32.4	2.6	1.2	4.1	0.3	180.0				31.6	10.4		1.4
	5.0	0	1.0	40.7	11.4	1.4	4.7	1.2	192.5				33.4	32.3		5.0
	2.2	0	1.0	40.1	12.1	1.6	4.7	1.7	242.0				33.9	105.7		2.2
	6.6	0	5.0	96.7	11.0	1.8	7.9	2.2	210.5				36.6	0		6.6
	13.7	0	3.0	34.6	12.8	1.6	5.9	2.4	220.2		17.3		37.3	44.3		13.7
	0	0	1.0	28.1	4.2	1.4	7.2	2.2	192.0		31.5		31.9	0		0
	29.9	0	20.0	374.2	64.8	15.0	38.0	11.2	—		49.2		399.8	191.1		29.9

go loss Pueblo Reservoir evaporation
year.
through Power Plant.

NOTE:
Water in thousands of acre-feet.
Power in millions of kilowatthours.

REC. 1949

62757 O - 55 (Face p. 376) No. 1

		SUGAR LOAF RESERVOIR								ELBERT POWERPLANT						SNOWDEN DIVERSON				TWIN LAKES RESERVOIR								WAPACO POWERPLANT				WAPACO INTERCEPTION AND PRINCETON POWERPLANT							JOHNSON POWERPLANT						
Water year	Month	Inflow from Fryingpan Diver.	Lake Fork of Arkansas River	Irrigation release for Lake Fork lands	Fish release for Lake Fork	Release to Elbert Canal	Reservoir evaporation	Reservoir content end of month	Reservoir spills	Malheuro Creek 24.9 sq. mi.	Malheuro Creek spills	Irrigation by-pass Malheuro Creek land	Elbert Canal loss 10%	Total flow thru Elbert Power Canal	Power generated Elbert Power Plant	Inflow from small existing tributaries diver.	192.5 sq. mi. Arkansas R. drainage available at Snowden diver.	Fish flow passed at Snowden Diver.	Total available at Snowden Diver.	Twin Lakes (Independence Pass) Diver.	Lake Creek 108.0 sq. mi.	Total inflow to Twin Lakes	Fish flow released for demand at Granite	Release to Granite Power Plant	Power generated at Granite Power Plant	Reservoir evaporation	Reservoir content end of month	Reservoir spills	Spills below Granite Power Plant	Clear Creek 97.7 sq. mi.	97.4 sq. mi. above Clear Creek Canal	Total flow thru Wapaco Power Plant	Power generated at Wapaco Power Plant	79.9 sq. mi. above Granite Cage	25.8 sq. mi. above Wapaco Interception	Fish flow by-passed at Wapaco Interception	Wapaco Interception to Princeton Power Plant	Canal loss 5% & Interception loss	Total flow to Princeton Power Plant	Power generated at Princeton Power Plant	Chalk Creek 68.8 sq. mi.	Chalk Creek spills	Irrigation by-pass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 5% & Interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)
				1/	2/			10000				4/					6/						9/				11/									12/													
1910	Oct.	24	0.6	0	0.3	17.5	0.3	849		0.5	0	0	1.8	16.2	6.8	0	2.6	1.8	2.7	0.4	2.3	2.1.8	1.7	17.3	41	0.5	45.3		1.9	1.2	20.4	8.3	0.5	0.3	4.0	0.3	1.0	13.7	4.5	1.6	0	1.6	0	0.6	19.1	4.2
	Nov	1.5	0.5	0	0.3	17.5	0.2	687		0.5	0	0	1.8	16.2	6.8		2.2	1.8	2.5	0.8	1.9	20.9	1.8	17.1	40	0.3	47.0		1.9	1.5	17.5	7.9	0.4	0.4	4.0	0.5	1.0	13.9	4.5	1.5	0	0	0.5	0.6	19.7	4.3
	Dec.	0.1	0.4	0	0.3	17.4	0.1	574		0.4	0	0	1.8	16.2	6.8		1.8	1.8	2.1	0.2	1.8	22.0	1.9	17.2	43	0.1	46.8		1.8	1.4	20.5	8.3	0.3	0.3	4.0	0.4	1.0	13.9	4.5	1.5	0	0	0.5	0.6	19.7	4.3
1911	Jan.	0	0.4	0	0.3	17.4	0.1	398		0.4	0	0	1.8	16.2	6.8		1.9	1.8	2.4	0.2	1.7	20.3	1.9	17.2	40	0.1	47.9		0.7	1.1	19.0	7.9	0.3	0.3	4.0	0.3	1.0	13.9	4.4	1.4	0	0	0.5	0.6	18.0	4.0
	Feb	0	0.4	0	0.3	17.7	0.1	161		0.3	0	0	1.8	16.2	6.8		1.5	1.8	1.8	0.1	1.4	19.5	1.9	33.7	39	0.1	51.7		0.9	1.4	36.0	14.6	0.3	0.4	4.0	0.4	2.2	34.2	7.8	1.7	0	0	0.5	1.0	33.6	7.5
	Mar	1.0	0.5	0	0.3	0	0.1	177		0.4	0	0	0	0.4	0.2		2.1	1.8	2.6	0.1	1.9	3.0	1.8	32.8	39	0.1	0		1.0	1.2	35.0	14.2	0.4	0.3	4.0	0.3	1.8	32.5	7.6	1.9	0	0	1.0	2.2	32.7	7.3
	Apr	2.0	1.0	0	0.3	17.2	0.1	3.6		0.8	0	0	1.8	16.2	6.8		3.9	1.8	4.2	0.4	2.3	24.3	1.5	22.8	54	0	0		1.6	0.4	24.8	10.1	0.7	0.1	4.0	0.1	1.2	23.7	5.4	1.2	0	1.2	0	0.7	23.0	5.1
	May	24.5	2.6	0.9	0	0	0.1	29.7		1.9	0	1.0	0.1	0.8	0.3		22.3	2.7	24.6	0	3.0	32.2	1.9	7.6	0	13.8		0	3.8	0	36.0	14.6	3.9	0	4.0	2.6	4.4	34.2	7.8	4.4	0	4.0	0	1.2	32.7	7.3
	June	42.4	12.5	0.9	0	0	0.2	83.5		6.8	1.0	1.0	0.5	4.3	1.8		26.3	3.4	28.5	0	6.0	60.0	1.4	40.5	0	41.3	17.3	0	36.0	14.6	2.3	0.8	4.0	1.0	2.8	34.2	7.8	23.6	2.6	4.0	0	2.6	43.6	9.8
	July	19.0	5.3	0.9	0	0	0.4	106.5		6.0	0.6	1.0	0.4	4.0	1.7		13.1	1.9	14.1	0	2.2	24.1	1.9	13.4	0	32.2	20.1	3.1	36.0	14.6	1.8	0.8	4.0	1.0	2.8	34.2	7.8	15.9	0.2	4.0	0	2.3	43.6	9.8
	Aug.	3.0	3.2	0.9	0	0	0.5	111.3		2.0	0	1.0	0.1	0.9	0.3		10.7	1.8	10.9							1.9	7.3	2.1	36.0	14.6	1.8	0.6	4.0	0.6	2.4	34.2	7.8	5.6	0	4.0	0	1.1	34.5	7.9
1911	Sept.	0.4	1.2	0.9	0	0	0.4	111.6		0.9	0	0.9	0	0	0		5.2	1.8	5.2	0	1.3	17.1	1.5	19.1	45	0.7	37.6		0	4.3	1.5	24.9	10.1	0.7	0.4	4.0	0.4	1.3	24.0	5.5	3.0	0	3.0	0	0.7	23.3	5.3
Totals		77.3	28.6	4.5	2.1	115.1	2.6	—	0	20.9	1.6	4.9	11.9	107.6	45.2	0	92.6	24.7	92.9	56.1	104.4	358.0	14.2	343.4	80.8	3.8	—	0	75.4	61.3	14.8	344.1	139.6	16.2	4.0	48.0	11.1	26.2	329.0	75.2	66.1	2.8	21.8	2.5	18.0	359.0	77.4
1911	Oct.	3.0	1.2	0	0.3	16.8	0.3	784		1.2	0	0	1.8	16.2	6.8	0	4.6	1.8	4.9	0.4	4.3	25.8	1.4	10.8	2.5	0.5	52.7		7.5	1.6	19.9	8.1	0.8	0.4	4.0	0.4	1.0	19.3	4.4	7.5	0	4.0	0	0.7	32.1	4.9
	Nov	1.7	0.8	0	0.3	17.2	0.2	772		0.8	0	0	1.8	16.2	6.8		2.5	1.8	2.8	0.3	2.1	28.4	1.8	16.0	3.8	0.3	56.4		1.4	2.1	19.5	7.9	0.4	0.6	4.0	0.6	1.0	19.1	4.4	1.7	0	0	0.5	0.6	19.9	4.5
	Dec.	1.4	0.3	0	0.3	17.7	0.1	664		0.3	0	0	1.8	16.2	6.8		1.1	1.8	1.4	0.2	1.9	17.1	1.9	17.1	40	0.2	54.0		1.2	1.6	19.9	8.1	0.2	0.5	4.0	0.5	1.0	19.4	4.4	1.4	0	0	0.5	0.6	19.7	4.5
1912	Jan.	0.3	0.3	0	0.3	17.7	0.1	972		0.2	0	0	1.8	16.2	6.8		1.1	1.8	1.4	0.2	1.8	18.8	2.0	38.5	39	0.1	39.1		1.0	1.5	36.0	14.6	0.2	0.4	4.0	0.4	2.2	34.2	7.8	1.0	0	0	0.5	1.0	33.7	7.6
	Feb	0.2	0.3	0	0.3	17.8	0.1	315		0.2	0	0	1.8	16.2	6.8		1.1	1.8	1.4	0.1	1.8	18.7	2.0	33.7	39	0.1	22.0		0.9	1.4	36.0	14.6	0.2	0.4	4.0	0.4	2.2	34.2	7.8	0.7	0	0	0.5	1.0	33.4	7.5
	Mar	0.3	0.4	0	0.3	17.6	0.1	142		0.4	0	0	1.8	16.2	6.8		1.3	1.8	2.1	0.1	1.9	20.0	1.9	33.7	39	0.1	6.3		1.0	1.3	36.0	14.6	0.3	0.3	4.0	0.3	2.1	34.2	7.8	0.6	0	0	0.5	1.0	33.7	7.6
	Apr	0	0.3	0	0.3	14.4	0.1	0.2		0.6	0	0	1.5	13.5	5.7		2.9	1.8	3.9	0.4	2.6	19.4	1.7	33.8	39	0.2	0		1.8	0.7	26.3	10.7	0.5	0.2	4.0	0.2	1.3	25.2	5.7	0.7	0	0.9	0	0.8	24.4	5.5
	May	19.1	2.5	0.9	0	6.8	0.1	140		1.2	0	1.0	0.7	6.3	2.7		22.5	2.9	23.1	0	4.9	33.1	1.9	33.7	39	0.3	0	0	36.0	14.6	3.9	0	4.0	2.8	4.6	34.2	7.8	7.8	0	4.0	0	1.1	36.7	8.3
	June	65.6	11.9	0.9	0	0	0.2	76.4		8.3	2.0	1.0	0.5	4.8	2.0		23.2	3.6	24.0	0	6.0	60.0	1.4	46.8	0	40.4	16.4	0	36.0	14.6	4.1	0	4.0	3.7	5.5	34.2	7.8	26.2	4.0	4.0	0	2.8	43.6	9.8
	July	34.0	7.2	0.9	0	0	0.4	110.3		8.4	2.2	1.0	0.5	4.9	2.1		16.7	2.1	17.2	0	3.3	37.5	1.9	41.1	0	40.8	15.6	1.2	36.0	14.6	2.9	0.3	4.0	1.9	3.1	34.2	7.8	17.8	0.6	4.0	0	2.8	43.6	9.8
	Aug.	6.7	2.5	0.9	0	1.1	0.5	117.0		3.4	0	1.0	0.4	3.1	1.3		7.2	1.8	7.7							8.0	6.2	0.4	36.0	14.6	1.2	0.1	4.0	0.1	1.9	34.2	7.8	8.3	0	4.0	0	1.2	37.3	8.2
1912	Sept.	0	0.9	0.9	0	0	0.5	116.5		1.2	0	1.0	0	0.2	0.1	0	3.8	1.8	4.1	0	3.3	7.5	1.5	19.1	45	0.7	24.7	38.3	0	4.1	1.6	24.8	10.1	0.7	0.4	4.0	0.4	1.3	23.9	5.4	2.3	0	2.3	0	0.7	23.2	5.2
Totals		112.3	29.1	4.5	2.1	127.2	2.7	—	0	26.4	4.2	5.0	14.4	130.0	54.7	0	88.5	24.8	93.9	69.1	103.1	396.1	15.3	377.5	88.7	4.6	—	0	89.2	60.7	13.4	362.4	147.1	15.4	3.6	48.0	11.1	27.2	346.3	78.9	76.9	4.6	23.7	2.5	21.3	371.1	81.6
1912	Oct.	4.3	0.9	0	0.3	17.4	0.3	1047		0.6	0	0	1.8	16.2	6.8	0	3.2	1.8	3.5	0.4	2.8	22.7	1.6	15.4	3.6	0.4	49.8		3.5	1.7	20.6	8.4	0.6	0.5	4.0	0.5	1.1	20.0	4.6	1.8	0	1.8	0	0.6	19.4	4.6
	Nov	1.2	0.8	0	0.3	17.4	0.2	848		0.6	0	0	1.8	16.2	6.8	0	2.6	1.8	2.9	0.3	2.5	21.7	1.7	16.0	3.8	0.3	47.7		1.4	2.2	19.6	8.0	0.5	0.6	4.0	0.6	1.0	19.2	4.4	1.4	0	0	0.5	0.6	19.3	4.6
	Dec.	0.8	0.8	0	0.3	17.6	0.1	679		0.4	0	0	1.8	16.2	6.8	0	2.0	1.8	2.3	0.2	1.7	20.4	1.9	17.6	41	0.1	48.5		0.9	1.5	20.0	8.4	0.4	0.4	4.0	0.4	1.0	19.4	4.4	1.1	0	0	0.5	0.6	19.5	4.6
1913	Jan.	0.2	0.5	0	0.3	13.6	0.1	547		0.4	0	0	1.4	12.6	5.3	0	2.0	1.8	1.7	0.2	1.7	16.4	1.9	17.2	40	0.1	45.7		0.9	1.6	19.7	8.0	0.3	0.4	4.0	0.4	1.0	19.1	4.4	0.6	0	0	0.5	0.6	18.6	4.4
	Feb	0	0.8	0	0.3	0	0.1	546		0.8	0	0	0	0.8	0.3	0	1.5	1.8	1.9	0.1	1.8	18.8	1.9	13.8	42	0.1	27.6		0.8	1.8	19.9	8.1	0.3	0.4	4.0	0.4	1.0	19.3	4.4	0.5	0	0	0.5	0.6	18.7	4.4
	Mar	0.6	0.8	0	0.3	0	0.1	556		0.7	0	0	0	0.7	0.3	0	2.1	1.8	2.4	0.1	1.7	19.8	1.7	11.2	3.1	0.4	25.0	25	0.6	0.6	20.1	8.0	0.5	0.2	4.0	0.2	1.1	20.1	4.6	0.9	0	0.9	0	0.6	18.5	4.3
	Apr	1.0	0.8	0	0.3	0	0.1	1.6		1.0	0	0	0	1.0	0.4	0	4.4	1.8	3.0	0.4	4.0	8.3	1.9	16.7	3.9	0.2	1.2		2.1	1.0	19.8	8.0	0.8	0.3	4.0	0.3	1.0	19.8	4.5	1.2	0	1.2	0	0.6	19.2	4.5
	May	20.2	3.0	0.9	0	0	0.2	83.7		2.6	0	1.0	0.2	2.4	1.0	0	6.6	2.7	24.5	0	2.6	6.3	0.5	61.0	0	9.4	0	36.0	14.6	2.3	0	4.0	1.5	3.3	34.2	7.8	18.2	0.8	4.0	0	4.0	43.6	9.8
	June	29.1	7.7	0.9	0	0	0.3	109.3		5.1	0.3	1.0	0.2	3.4	1.4	0	19.2	2.2	19.6	0	4.8	11.2	1.9	38.0	8.7	0.7	63.1		10.3	7.3	1.0	36.0	14.6	2.1	0.3	4.0	0.3	2.1	34.2	7.8	9.4	0	4.0	0	1.2	38.4	8.7
	July	6.5	4.1	0.9	0	0	0.5	116.5		3.1	0	1.0	0.2	1.9	0.8	0	11.9	1.8	12.2	0	1.7	17.0	1.9	40.9	9.3	0.7	54.0		0	2.8	0.9	27.8	11.3	1.2	0.2	4.0	0.2	1.4	26.6	6.1	2.1	0	2.1	0	0.8	25.8	5.8
	Aug.	0	1.8	0.9	0	0	0.5	116.9		1.2	0	1.0	0	0.2	0.1	0	6.9	1.8	7.0	0	2.2	9.3	1.9	13.6	3.1	0.4	44.5		0	1.2	24.8	10.1	0.9	0.3	4.0	0.3	1.3	23.8	5.4	4.0	0	4.0	0	0.7	23.1	5.3
1913	Sept.	0	1.1	0.9	0	0	0.5	116.6		0.8	0	0.8	0	0	0	0	4.8	1.8	4.7	0	1.6	12.1	1.5	13.6	3.0	0.4	44.5		0	3.1	1.3	18.8	7.6	0.7	0.4	4.0	0.4	1.0	18.2	4.1	2.2	0	2.2	0	0.5	17.7	4.0
Totals		63.1	22.6	4.5	2.1	66.0	3.0	—	0	16.8	0.3	4.9	7.8	69.9	29.4	0	38.2	24.1	83.6	52.4	80.6	286.5	14.5	244.4	61.5	4.4	—	0	10.3	37.1	12.0	301.2	122.3	15.4	3.6	48.0	9.6	24.6	289.2	66.1	60.1	0.8	21.8	2.5	12.1	302.1	68.5
1913	Oct.	1.7	1.8	0	0.3	17.8	0.3	1041		0.8	0	0	1.8	16.2	6.8	0	3.9	1.8	4.2	0.4	2.3	24.1	1.5	15.7	3.7	0.5	50.9		2.5	1.4	20.6	8.4	0.7	0.4	4.0	0.4	1.0	20.0	4.6	2.3	0	2.3	0	0.6	19.4	4.6
	Nov	1.2	0.8	0	0.3	17.8	0.2	847		0.8	0	0	1.8	16.2	6.8	0	3.2	1.8	3.5	0.3	2.4	22.6	1.7	16.7	3.7	0.3	57.8		1.2	1.7	19.6	8.0	0.5	0.5	4.0	0.5	1.0	19.1	4.4	1.8	0	0	0.5	0.6	19.3	4.6
	Dec.	0.7	0.5	0	0.3	17.6	0.1	679		0.4	0	0	1.8	16.2	6.8	0	2.1	1.8	2.4	0.2	1.9	20.7	1.8	17.6	41	0.2	55.9		1.0	1.5	20.1	8.2	0.4	0.4	4.0	0.4	1.0	19.5	4.4	1.1	0	0	0.5	0.6	19.5	4.6
1914	Jan.	0.2	0.5	0	0.3	17.5	0.1	507		0.5	0	0	1.8	16.2	6.8	0	2.1	1.8	2.4	0.2	1.9	20.7	1.8	32.8	7.7	0.2	44.8		1.0	1.7	35.5	14.4	0.4	0.5	4.0	0.5	1.8	34.2	7.8	2.0	0	0	0.5	1.0	33.7	7.6
	Feb	0	0.8	0	0.3	17.6	0.1	331		0.4	0	0	1.8	16.2	6.8	0	1.8	1.8	2.1	0.1	1.6	20.0	1.9	33.2	7.8	0.1	26.6		0.9	1.4	35.5	14.4	0.3	0.4	4.0	0.4	1.8	34.1	7.8	0.9	0	0	0.5	1.0	33.5	7.6
	Mar	0.9	0.5	0	0.3	17.5	0.1	160		0.5	0	0	1.8	16.2	6.8	0	2.1	1.8	2.4	0.1	1.9	20.6	1.8	32.6	7.7	0.1	16.5		1.3	1.6	35.5	14.4	0.4	0.4	4.0	0.4	1.8	34.1	7.8	1.8	0	0	0.5	1.0	33.6	7.6
	Apr	0.1	1.0	0	0.3	15.2	0.1	1.5		0.8	0	0	1.6	14.4	6.1	0	3.8	1.8	3.9	0.4	2.8	32.0	1.6	32.8	7.7	0.2	0.1		2.2	0.2	35.8	14.5	0.6	0.2	4.0	0.2	1.4	34.2	7.8	1.8	0	1.8	0	1.0	33.2	7.6
	May	22.9	2.6	0.9	0	0	0.1	31.0		2.2	0	1.0	0.1	1.1	0.5	0	22.3	2.7	21.6	18.5	13.5	54.7	0	27.0	6.8	0.3	26.5		5.4	0	33.4	13.6	3.9	0	4.0	2.6	4.8	34.2	7.8	3.9	0	4.0	0	1.2	38.7	8.8
	June	64.2	11.7	0.9	0	0	0.2	15.8		7.9	1.7	1.0	0.5	4.7	2.0	0	23.8	3.5	23.9	23.1	21.7	89.4	0	6.0	1.4	0.5	103.4		22.7	3.0	31.7	11.9	4.0	0.8	4.0	4.3	1.8	34.2	7.8	19.5	1.1	4.0	0	2.0	43.6	9.8
	July	18.6	4.6	0.9	0	0	0.4	103.7		6.6	0.8	1.0	0.5	4.3	1.8	0	16.5	2.0	17.7	14.9	22.7	69.6	0	11.2	2.6	0.9	160.9		2.8	1.0	40.4	17.1	1.8	0.8	4.0	1.7	1.8	34.2	7.8	12.5	0	4.0	0	1.9	42.6	9.6
	Aug.	2.9	2.3	0.9	0	0	0.5	116.5		2.1	0	1.0	0.1	1.0	0.4	0	10.9	1.8	11.0	8.1	12.4	30.5	0.2	25.1	5.7	0.2	164.9		1.6	2.2	2.3	36.0	14.6	1.9	0.6	4.0	0.6	2.4	34.2	7.8	2.0	0	4.0	0	1.1	36.1	8.2
1914	Sept.	0.4	1.1	0.9	0	0	0.5	116.8		0.8	0	0.8	0	0	0	0	4.9	1.8	4.8	2.3	4.3	11.4	1.3	17.4	4.0	1.1	154.5		0	4.0	1.2	24.7	10.0	0.9	0.4	4.0	0.4	1.3	23.8	5.4	2.9	0	2.9	0	0.7	23.1	5.3
Totals		100.9	32.0	4.5	2.1	120.8	2.7	—	0	22.8	2.5	4.8	13.6	122.7	54.6	0	94.9	24.5	99.9	77.6	102.1	401.3	13.6	272.1	63.9	5.6	—	0	1.6	71.7	20.8	362.5	147.2	16.2	5.6	48.0	12.6	19.3	355.8	81.2	61.7	1.1	22.5	2.5	15.1	376.3	84.8
1914	Oct.	1.5	1.1	0	0.3	17.1	0.3	1019		0.9	0	0	1.8	16.2	6.8	0	4.3	1.8	4.6	0.4	3.8	25.0	1.4	14.3	3.4	0.7	163.1		4.6	1.9	20.8	8.4	0.8	0.5	4.0	0.5	1.1	20.3	4.6	2.4	0	2.4	0	0.6	19.6	4.6
	Nov	0.8	0.8	0	0.3	0	0.2	1028		0.6	0	0	0.1	0.5	0.2	0	2.6	1.8	3.0	0.3	2.5	4.5	1.7	20.4	4.8	0.5	145.0		1.5	2.2	20.1	8.1	0.5	0.6	4.0	0.6	1.2	19.8	4.4	2.4	0	0	0.5	0.6	19.8	4.6
	Dec.	0.2	0.6	0	0.3	17.5	0.1	957		0.5	0	0	1.8	16.2	6.8	0	2.5	1.8	2.8	0.2	2.2	21.4	1.8	17.5	4.1	0.2	146.9		1.1	1.8	20.4	8.3	0.4	0.5	4.0	0.5	1.0	19.9	4.5	1.3	0	0	0.5	0.6	20.0	4.6
1915	Jan.	0	0.4	0	0.3	17.6	0.1	681		0.4	0	0	1.8	16.2	6.8	0	1.8	1.8	2.1	0.2	1.5	20.0	1.9	16.7	3.9	0.2	148.1		0.9	1.4	19.0	7.7	0.3	0.4	4.0	0.4	1.0	18.4	4.2	0.9	0	0	0.5	0.6	18.2	4.2
	Feb	0	0.4	0	0.3	17.7	0.1	504		0.3	0	0	1.8	16.2	6.8	0	1.6	1.8	1.9	0.1	1.4	19.5	1.9	13.4	3.1	0.2	152.1		0.8	1.3	16.5	6.8	0.3	0.4	4.0	0.3	0.8	16.1	3.4	0.8	0	0	0.5	0.5	14.9	3.4
	Mar	0	0.4	0	0.3	5.1	0.1	46.3		0.4	0	0	0.6	4.9	2.1	0	1.9	1.8	1.8	0.1	1.6	7.6	1.9	17.1	4.0	0.2	140.5		1.2	1.3	19.6	8.0	0.3	0.4	4.0	0.4	1.0	19.0	4.3	0.9	0	0	0.5	0.6	18.8	4.1
	Apr	1.1	0.8	0	0.3	0	0.1	46.8		0.7	0	0	0.1	0.6	0.3	0	3.1	1.8	3.7	0.4	2.7	5.4	1.7	16.9	4.0	0.4	126.9		2.0	1.6	20.5	8.3	0.5	0.3	4.

Reservoir spills	WAPAGO POWERPLANT: Spills below Granite Power Plant	Clear Creek 87.7 sq. mi.	37.4 sq. mi. above Clear Creek Canal	Total flow thru Wapago Power Plant	Power generated at Wapago Power Plant
(32)	(33)	(34)	(35)	(36)	(37)
	1.9	1.2	20.4	23.5	
	1.0	1.4	17.5	19.9	
	0.9	1.4	20.5	22.8	
	0.7	1.1	19.0	20.7	
	0.9	1.4	34.0	36.3	
	1.0	1.2	35.0	37.2	
	1.6	0.4	24.5	26.5	
	3.8	0	36.0	39.8	
41.3	17.3	0	36.0	53.3	
32.2	22.7	3.1	36.0	71.8	
1.9	7.8	2.1	36.0	47.8	
0	4.3	1.5	24.9	30.7	
0	75.4	61.3	19.8	344.1	139.6
	7.5	1.6	19.9	29.0	
	1.4	2.1	19.5	22.9	
	1.3	1.6	19.7	22.6	
	1.0	1.5	34.0	36.5	
	0.9	1.4	34.0	36.3	
	1.0	1.3	34.0	36.3	
	1.8	0.7	24.3	26.8	
0	3.6	0	36.0	39.6	
40.4	16.4	0	36.0	56.4	
49.8	15.6	1.3	36.0	66.9	
8.0	6.7	0.4	36.0	44.7	
0	4.1	1.4	24.8	30.3	
0	89.2	60.7	13.4	362.4	147.1
	3.5	2.7	20.6	26.8	
	2.4	2.2	19.6	24.2	
	2.9	1.5	20.0	24.4	
	0.7	1.6	19.7	22.0	
	0.8	1.8	19.7	22.3	
	0.6	0.6	21.0	22.5	
	2.1	1.0	19.8	22.9	
0	2.4	0	36.0	38.4	
0	9.4	0	36.0	45.4	
10.3	7.3	1.0	36.0	54.6	
0	2.8	0.9	27.8	31.5	
0	4.0	1.2	24.8	30.0	
0	10.3	37.1	12.8	301.2	122.3
	3.5	1.4	20.6	25.5	
	1.2	1.7	19.6	22.5	
	1.0	1.5	20.1	22.6	
	1.0	1.7	35.5	38.2	
	0.9	1.4	35.5	37.8	
	1.3	1.6	35.5	38.4	
	2.2	0.8	35.5	38.5	
	4.2	0.8	33.9	38.9	
	22.7	3.0	31.7	57.4	
0	28.8	3.6	34.1	66.5	
1.6	10.2	2.3	36.0	49.6	
0	8.0	1.8	24.9	34.7	
0	14.6	71.7	20.8	362.5	147.2
	4.6	1.9	20.8	27.4	
	1.5	2.2	20.1	23.8	
	1.1	1.8	20.4	23.3	
	0.9	1.4	19.0	21.3	
	0.8	1.3	16.5	18.6	
	1.2	1.3	19.6	22.0	
	2.0	1.5	20.5	24.0	
	2.0	0	20.6	22.6	
	1.3	0.4	19.1	20.8	
	7.8	0.5	20.4	28.7	
	4.9	1.8	22.8	29.5	
	3.1	1.3	18.8	23.2	
	44.2	14.9	240.6	297.7	

Reservoir spills	WAPAGO INTERCEPTION AND PRINCETON POWERPLANT: 79.9 sq. mi. above Granite Gage	28.8 sq. mi. above Wapago Interception	Flow by-passed at Wapago Interception	Wapago Interception to Princeton Power Plant	Canal loss 25% Interception loss	Total flow thru Princeton Power Plant	Power generated at Princeton Power Plant
(38)	(39)	(40)	(41)	(42) 12/	(43)	(44) 13/	(45)
	0.5	0.3	40	0.3	1.0	19.7	45
	0.4	0.4	40	0.4	1.0	19.7	45
	0.3	0.4	40	0.4	1.0	19.7	45
	0.3	0.3	40	0.3	1.0	19.7	44
	0.3	0.4	40	0.4	2.2	34.2	78
	0.4	0.3	40	0.3	1.8	33.5	76
	0.7	0.1	40	0.1	1.2	33.7	76
	1.2	0	40	0	1.2	33.9	77
	3.9	0	40	2.6	4.4	34.2	78
	4.4	0	40	4.3	6.7	34.2	78
	2.3	0.8	40	1.0	2.8	34.2	78
	1.8	0.6	40	0.6	2.4	34.2	78
	0.9	0.4	40	0.4	1.3	24.0	55
0	16.2	4.0	48.0	11.1	26.2	339.0	75.2
	0.8	0.4	40	0.4	1.0	19.3	44
	0.4	0.6	40	0.6	1.0	19.1	44
	0.2	0.5	40	0.5	1.0	19.4	44
	0.2	0.4	40	0.4	2.2	34.2	78
	0.2	0.4	40	0.4	2.2	34.2	78
	0.3	0.3	40	0.3	2.1	34.2	78
	0.5	0.2	40	0.2	1.3	25.2	57
	3.6	0	40	2.8	4.6	34.2	78
	4.1	0	40	3.7	5.5	34.2	78
	2.9	0.3	40	1.9	3.1	34.2	78
	1.2	0.4	40	0.1	1.9	34.2	77
	0.7	0.4	40	0.4	1.3	23.9	54
0	15.4	3.6	48.0	11.1	27.2	346.3	78.9
	0.6	0.8	40	0.5	1.1	20.0	46
	0.5	0.4	40	0.4	1.0	19.5	43
	0.3	0.4	40	0.4	1.0	19.2	43
	0.3	0.4	40	0.4	1.0	19.1	44
	0.3	0.4	40	0.4	1.0	19.3	44
	0.5	0.2	40	0.2	1.1	20.1	46
	0.8	0.8	40	0.8	1.0	19.1	44
	0.3	0.4	40	0.4	1.0	19.3	44
	0.5	0.2	40	0.2	1.1	20.1	46
	0.8	0.8	40	0.3	1.0	19.1	44
	4.6	0	40	4.5	6.3	34.2	78
	2.5	0	40	1.5	3.3	34.2	78
	2.1	0.3	40	0.3	2.1	34.2	78
	1.2	0.2	40	0.2	1.4	22.6	51
	0.9	0.8	40	0.3	1.3	23.8	54
	15.4	3.6	48.0	9.6	21.6	289.2	66.1
	0.7	0.4	40	0.4	1.0	20.0	46
	0.5	0.5	40	0.5	1.0	19.1	44
	0.4	0.4	40	0.4	1.0	19.5	43
	0.4	0.5	40	0.5	1.8	34.2	78
	0.3	0.4	40	0.4	1.8	34.1	78
	0.4	0.4	40	0.4	1.8	34.1	78
	0.6	0.2	40	0.2	1.8	34.2	78
	2.9	1.0	40	1.9	1.8	34.2	78
	1.9	0.6	40	0.6	2.4	34.2	78
	0.9	0.4	40	0.4	1.3	23.8	54
0	16.9	5.6	48.0	12.6	17.3	355.8	81.2
	2.4	0	2.4	0	0.6	19.6	43
	2.4	0	0	0.5	0.8	18.6	42
	2.3	0	0	0.5	0.8	20.0	46
	0.9	0	0	0.5	0.6	18.4	42
	0.8	0	0	0.5	0.5	19.7	43
	0.9	0	0	0.5	0.6	19.8	43
	1.6	0	1.6	0	0.6	19.2	42
	1.7	0	0	0.5	0.6	20.1	45
	5.9	0	0	0.5	0.8	20.0	45
	14.1	0.3	0	0.3	0.9	29.0	64
	7.5	0.1	0	0.1	0.7	22.3	49
	2.3	0	2.3	0	0.7	22.4	49
	2.2	0	2.2	0	0.5	19.7	43
	45.2	0.4	21.5	2.5	7.7	247.5	544

Reservoir spills	JOHNSON POWERPLANT: Chalk Creek 60.6 sq. mi.	Chalk Creek spills	Irrigation by-pass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 25% Interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant
(46)	(47)	(48) 14/	(49) 15/	(50) 16/	(51)	(52) 17/	(53)
	1.6	0	1.6	0	0.6	19.1	42
	1.5	0	0	0.5	0.6	19.3	42
	0.9	0	0	0.5	0.6	19.1	43
	0.8	0	0	0.5	0.5	18.0	40
	0.7	0	0	0.5	1.0	32.9	72
	1.2	0	1.2	0	0.7	23.0	51
	4.4	0	4.0	0	1.2	33.4	77
	23.6	2.6	4.0	0	7.6	43.6	96
	15.7	0.2	4.0	0	2.6	37.6	86
	5.2	0	5.0	0	1.1	31.5	70
	3.0	0	3.0	0	0.7	23.3	51
0	66.1	2.8	23.8	2.5	18.0	359.0	77.0
	7.5	0	4.0	0	0.7	22.1	49
	1.7	0	0	0.5	0.6	19.7	44
	1.4	0	0	0.5	0.6	19.7	43
	1.0	0	0	0.5	1.0	33.7	74
	0.7	0	0	0.5	1.0	33.6	74
	0.9	0	0	0.5	0.6	18.4	41
	0.9	0	0.9	0	0.8	24.4	54
	7.8	0	4.0	0	1.2	33.4	77
	26.2	4.0	4.0	0	7.8	43.6	96
	17.8	0.6	4.0	0	3.8	43.6	96
	5.3	0	4.0	0	1.2	37.3	82
	2.3	0	2.3	0	0.7	22.7	51
0	76.9	4.6	23.7	2.5	21.3	371.1	81.6
	4.8	0	1.8	0	0.6	19.4	43
	1.4	0	0	0.5	0.6	19.5	43
	1.0	0	0	0.5	0.6	19.2	43
	0.6	0	0	0.5	0.6	18.8	41
	0.5	0	0	0.5	0.6	18.7	41
	0.6	0	0	0.5	0.6	19.6	43
	0.9	0	0.7	0	0.6	18.7	41
	1.2	0	0	0.5	0.6	18.7	41
	0.8	0	0	0.5	0.6	19.4	43
	0.9	0	0	0.5	1.0	33.7	74
	0.7	0	0	0.5	1.0	33.5	74
	1.0	0	0	0.5	1.0	33.6	74
	1.8	0	1.8	0	0.6	33.2	73
	3.9	0	4.0	0	1.2	33.7	74
	18.5	1.1	4.0	0	5.0	43.6	96
	12.5	0	4.0	0	1.3	42.4	93
	2.0	0	4.0	0	1.1	36.1	79
	1.9	0.6	4.0	0	0.7	23.1	51
0	64.7	11	28.5	2.5	15.1	376.8	82.8
	2.8	0	2.3	0	0.6	19.4	43
	1.8	0	0	0.5	0.6	19.3	42
	0.4	0	0	0.5	0.6	19.5	43
	1.0	0	0	0.5	1.0	33.7	74
	0.7	0	0	0.5	1.0	33.5	74
	1.0	0	0	0.5	1.0	33.6	74
	1.8	0	1.8	0	0.6	33.2	73
	3.9	0	4.0	0	1.2	33.7	74
	18.5	1.1	4.0	0	5.0	43.6	96
	12.5	0	4.0	0	1.3	42.4	93
	2.0	0	4.0	0	1.1	36.1	79
	1.9	0.6	4.0	0	0.7	23.1	51
0	77.7	11	28.5	2.5	15.1	376.8	82.8

Reservoir spills	SALIDA POWERPLANT: Canal loss 25	Total flow thru Salida Power Plant	Power generated at Salida Power Plant
(54)	(55)	(56) 18/	(57)
	0.4	18.7	42
	0.4	18.9	43
	0.4	18.6	41
	0.4	17.6	38
	0.7	32.9	72
	0.7	32.2	70
	0.5	22.5	50
	0.8	32.6	72
	0.9	46.7	102
	0.9	46.7	102
	0.7	33.8	74
	0.7	32.7	72
	0.5	22.5	50
0	7.3	342.1	113.8
	0.4	21.7	72
	0.4	19.5	65
	0.4	19.3	64
	0.7	330	110
	0.7	32.7	72
	0.7	33.4	74
	0.5	23.9	53
	0.7	34.2	120
	0.7	32.7	142
	0.7	32.7	142
	0.7	34.6	122
	0.7	33.6	74
	0.7	32.7	142
	0.7	32.7	142
	0.7	34.6	122
	0.7	33.6	74
	0.5	22.5	50
	0.5	22.6	75
0	7.7	366.6	1224
	0.4	19.0	63
	0.4	19.1	63
	0.7	33.0	110
	0.7	32.8	109
	0.7	32.9	109
	0.7	32.5	108
	0.7	32.6	108
	0.7	32.7	142
	0.7	35.4	118
	0.5	22.6	75
0	7.7	366.6	1224
	0.4	19.2	64
	0.5	24.1	80
	0.4	19.6	64
	0.4	19.8	59
	0.4	19.8	59
	0.4	19.8	59
	0.4	18.4	41
	0.4	19.2	64
	0.4	18.8	41
	0.4	18.8	41
	0.4	19.2	64
	0.4	20.5	45
	0.4	20.6	45
	0.4	19.1	64
	0.4	22.4	93
	0.4	17.5	57
0	5.0	242.6	90.3

Reservoir spills	SALIDA GAGE: Cottonwood Creek 71.0 sq. mi.	489.0 sq. mi. uncontrolled area	Accumulated fish flows	Return of Chalk Creek spills (Col. 48)	Return of Chalk Creek irr. by-pass (Col. 49)	Canal loss returns plus spills below Granite Power Plant	Project operation flow to Salida Gage	Historical recession flow to Salida Gage
(58)	(59)	(60)	(61) 19/	(62)	(63)	(64) 20/	(65)	(66) 21/
	1.5	3.3	40	0	1.6	2.0	31.1	16.8
	1.5	2.8	45	0	0	2.0	29.7	18.1
	1.3	2.0	45	0	0	2.0	31.0	19.5
	1.1	2.2	45	0	0	2.0	28.5	18.0
	1.3	2.8	45	0	0	3.9	46.3	18.5
	1.2	3.5	45	0	0	3.5	44.7	19.4
	1.5	1.3	40	0	1.2	2.4	32.9	16.0
	1.5	1.3	40	0	1.2	2.4	32.9	16.0
	6.5	0	40	0	40	6.4	58.5	64.1
	16.5	0	40	2.6	40	58.9	125.7	138.0
	14.4	1.3	40	0.2	40	38.2	112.3	122.0
	5.3	5.4	40	0	40	6.1	57.1	57.0
	3.6	43	40	0	20	2.5	40.2	34.1
0	55.5	91.0	50.5	2.8	218	124.9	644.2	647.5
	4.7	46	40	0	40	2.1	91.1	38.8
	2.6	6.9	45	0	0	2.0	34.5	21.5
	2.2	4.7	45	0	0	2.0	32.7	19.6
	1.7	4.4	45	0	0	3.9	47.5	12.8
	1.1	4.1	45	0	0	3.9	46.3	11.4
	1.3	3.6	45	0	0	3.9	46.8	12.6
	1.2	3.2	40	0	0	2.6	34.7	14.3
	6.3	0	40	0	0.9	2.6	54.9	57.7
	15.2	0	40	4.0	40	58.6	125.5	132.0
	11.8	3.5	40	0.6	40	43.6	115.2	116.0
	6.5	1.1	40	0	40	11.8	64.0	64.1
	2.8	4.6	40	0	2.8	2.5	39.8	34.2
0	54.8	38.6	50.5	4.6	23.7	145.2	683.6	586.4
	2.8	4.7	40	0	18	2.1	33.9	22.6
	1.6	4.8	45	0	0	2.0	33.6	20.6
	1.2	4.4	45	0	0	2.0	31.0	18.2
	1.2	4.5	45	0	0	2.0	30.6	18.8
	1.1	3.8	45	0	0	2.0	29.6	18.5
	1.1	2.8	45	0	0	2.1	29.6	12.8
	1.1	2.7	40	0	0	2.0	28.1	12.5
	5.5	0	40	0	40	8.3	58.6	68.2
	7.0	0	40	0.8	40	8.2	70.5	86.9
	5.6	2.8	40	0	40	14.4	68.4	66.6
	2.0	2.5	40	0	2.1	2.7	40.6	30.9
	2.8	4.4	40	0	40	2.8	39.8	28.0
	82.9	230	50.5	1.8	21.8	50.3	494.1	394.1
	3.3	2.8	40	0	2.8	2.0	34.3	22.9
	2.2	2.0	45	0	0	2.0	32.2	18.8
	1.8	4.5	45	0	0	2.0	31.8	18.5
	1.8	4.7	45	0	0	3.5	47.0	18.6
	1.8	4.2	45	0	0	3.6	46.2	18.5
	1.2	4.7	45	0	0	3.6	46.8	15.6
	1.5	2.5	40	0	1.8	3.5	45.5	18.0
	2.0	4.0	40	0	1.8	3.5	45.7	18.6
	1.2	4.0	40	0	0	3.5	44.7	17.7

| Water year | Month | SUGAR LOAF RESERVOIR | | | | | | | | ELBERT POWERPLANT | | | | | | | | | SNOWDEN DIVERSON | | | | | TWIN LAKES RESERVOIR | | | | | | | | | | | WAPACO POWERPLANT | | | | | WAPACO INTERCEPTION AND PRINCETON POWERPLANT | | | | | | | | | JOHNSON POWERPLANT | | | | | | | | SALIDA POWERPLANT | | | | | |
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Con't.

WAPACO INTERCEPTION AND PRINCETON POWERPLANT

JOHNSON POWERPLANT

SALIDA POWERPLANT

SALIDA GAGE

PUEBLO RESERVOIR OPERATION

(37)	(38)	(39)	(40)	(41)	(42) 12/	(43)	(44) 13/	(45)	(46)	(47)	(48) 14/	(49) 15/	(50) 16/	(51)	(52) 17/	(53)	(54)	(55)	(56) 18/	(57)	(58)	(59)	(60)	(61) 19/	(62)	(63)	(64) 20/	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73) 23/	(74) 23/	(75)	(76)	(77)	(78) 24/	(79) 24/	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)
7.3		0.4	0.5	4.0	0.5	0.9	17.5	4.0		2.1	0	2.1	0	9.5	12.0	3.7		0.3	16.7	5.5		2.4	4.7	4.0	0	2.1	1.7	3.6	21.0	-1.2	12.1	1.2	42.5	33.1	31.9	0	0	0	31.9	1.8	1.1	3.7	1.4	19.9					34.0		0
7.6		0.3	0.5	4.0	0.5	1.0	18.3	4.2		1.6	0	0	0.5	0.6	18.8	4.1		0.4	15.4	6.1		1.7	5.0	4.5	0	0	2.0	3.6	21.6	-1.6	16.7	-1.6	42.3	29.3	29.0	7.9	0	0	7.9	0	0.9	0.9	1.0	22.4					33.4		0
8.0		0.4	0.4	4.0	0.4	1.0	19.1	4.4		1.6	0	0	0.5	0.6	19.6	4.3		0.4	15.8	6.2		1.6	4.5	4.5	0	0	2.0	3.6	21.7	-1.7	15.1	2.9	43.1	29.3	30.0	0	0	0	30.0	0	1.0	1.0	0.5	26.5					32.9		0
7.4		0.4	0.4	4.0	0.4	0.9	17.8	4.1		1.4	0	0	0.5	0.6	18.1	4.0		0.4	17.7	5.9		1.4	4.5	4.5	0	0	1.9	3.0	15.7	-1.6	11.8	1.2	40.2	27.5	28.0	0	0	0	28.0	0	1.0	1.0	0.5	29.5					29.5		0
5.9		0.3	0.4	4.0	0.4	0.8	14.3	3.2		1.2	0	0	0.5	0.4	14.6	3.2		0.3	14.3	4.7		1.2	3.7	4.5	0	0	1.5	2.5	18.2	-1.3	11.1	1.0	36.0	24.3	27.3	0	0	0	27.3	0	1.1	1.1	0.6	32.0					27.8		0
6.5		1.4	0.2	4.0	0.2	0.8	15.5	3.5		1.4	0	0	0.5	0.6	15.8	3.5		0.3	16.4	5.2		1.5	2.0	4.5	0	0	1.6	2.4	20.3	+0.1	10.0	1.0	36.0	25.0	26.3	8.2	0	0	8.2	0	1.1	1.1	0.6	34.6		0			30.0		0
7.2		1.0	0.3	4.0	0.3	0.9	17.2	3.9		1.5	0	0	0.5	0.5	16.7	3.7		0.3	16.4	5.4		1.8	2.9	4.0	0	0	1.7	2.7	23.3	-0.4	8.5	3.5	36.4	32.8	33.3	0	0	0	33.3	1.2	2.9	1.3	2.0	25.7		8.2			31.9		5.4
7.6		4.1	0.2	4.0	3.5	5.3	34.2	7.8		7.1	0	4.0	0	1.1	34.2	8.0		0.7	35.5	11.8		4.7	3.1	4.0	0	4.0	36.0	34.3	65.8	-2.3	13.5	8.0	97.5	79.3	71.3	7.6	20.7	17.0	116.6	2.0	1.4	7.9	1.5	220.7		0			64.7		36.6
7.6		4.3	0.1	4.0	4.8	6.6	34.2	7.8		20.4	1.3	4.0	0	5.7	43.6	9.6		0.9	42.7	14.2		15.4	1.0	4.0	1.3	4.0	54.6	128.8	140.0	+1.9	4.6	16.3	130.9	144.6	127.7	0	26.6	14.0	168.3	16.3	1.6	7.9	1.9	162.8		0			70.3		37.3
7.6		3.3	0.4	4.0	2.4	4.2	34.2	7.8		15.6	0.1	4.0	0	2.1	42.6	9.6		0.9	42.7	14.2		8.1	3.6	4.0	0.1	4.0	45.2	129.6	113.0	-1.8	1.4	9.0	129.2	114.4	108.4	0	49.0	24.0	178.4	9.0	1.8	7.9	1.8	104.0					73.1		68.6
7.6		2.6	0.6	4.0	1.2	3.0	34.2	7.8		5.9	0	4.0	0	1.1	35.0	7.7		0.7	34.3	11.4		5.4	5.8	4.0	0	4.0	38.7	96.1	81.8	-1.6	3.4	8.8	97.0	85.2	76.4	0	34.4	12.0	122.8	8.8	1.6	7.9	1.5	66.9					70.8		48.2
9.3		0.8	0.4	4.0	0.4	1.2	22.2	5.1		3.9	0	3.9	0	0.7	21.5	4.7		0.4	21.1	7.0		3.1	4.5	4.0	0	3.9	2.9	38.9	29.3	-1.1	-0.2	6.3	32.6	29.1	22.8	0	0.4	3.0	26.2	6.3	1.4	E.1	0.9	69.1					32.7		0.5
17.6		12.3	4.4	48.0	15.0	26.6	272.6	62.6		63.8	1.4	23.5	2.5	14.4	300.6	66.1		6.0	294.6	97.8		48.8	44.2	50.5	1.4	23.5	189.2	677.2	563.3	-12.6	10.6	69.6	766.2	666.9	585.2	13.0	13.1	77.0	726.3	63.1	15.0	50.4	13.5	—	0	81.2		535.9	0		196.6
9.1		0.8	0.4	4.0	0.4	1.1	24.7	4.9		2.4	0	2.4	0	0.7	21.0	4.6		0.4	20.6	6.8		2.7	4.5	4.0	0	2.4	2.2	36.4	26.3	-1.1	+4.4	1.5	39.7	30.7	29.2	0	0	2.0	31.2	1.5	1.1	2.6	0.7	74.3					33.7		0
7.7		0.3	0.5	4.0	0.5	1.0	18.4	4.2		2.0	0	0	0.5	0.6	19.3	4.2		0.4	18.9	6.3		2.1	5.1	4.5	0	2.0	2.0	32.6	20.9	-1.3	+10.2	1.8	41.5	31.1	29.1	0	0	0	29.1	0	0.9	0.5	0.5	101.5					33.4		0
8.1		0.4	0.6	4.0	0.5	1.0	19.5	4.4		1.8	0	0	0.5	0.6	19.6	4.3		0.4	19.2	6.4		1.9	4.7	4.5	0	0	2.0	32.3	16.9	-1.7	+11.8	2.2	42.4	28.7	29.1	0	0	0	29.1	0	1.0	0.6	0.3	143.7					34.7		0
8.0		0.4	0.4	4.0	0.4	1.0	19.1	4.1		1.6	0	0	0.5	0.6	18.8	4.0		0.4	17.6	5.8		1.6	4.4	4.5	0	0	2.0	30.1	15.0	-1.7	+12.2	1.5	40.6	27.8	29.1	0	0	0	29.1	0	1.0	0.6	0.4	176.8					32.7		0
12.3		0.8	0.4	4.0	0.4	1.5	27.2	6.7		0.9	0	0	0.5	0.9	28.7	6.3		0.6	28.1	9.3		1.8	3.1	4.5	0	0	2.0	44.7	12.1	-3.0	+ 9.1	1.2	46.8	22.2	6.0	0	0	0	6.0	0	0.9	0.7	0.4	216.3					48.7		0
9.5		0.4	0.4	4.0	0.4	1.8	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.4	4.3	4.5	0	0	3.5	46.7	15.0	-3.5	+ 6.8	3.6	50.0	21.8	6.1	0	0	0	6.1	0	0.7	0.5	0.5	258.6					55.9		0
9.5		0.6	0.2	4.0	0.2	1.8	34.2	7.8		1.0	0	1.0	0	1.0	33.2	7.3		0.7	32.5	10.8		1.3	1.8	4.0	0	3.5	44.1	15.5	-3.1	+ 6.0	1.9	47.0	21.5	18.6	21.5	0	0	2.0	23.5	18.6	1.1	6.2	1.1	252.3					58.8		22.5
9.6		2.3	0.1	4.0	0.4	2.2	34.2	7.8		3.1	0	3.1	0	1.0	33.2	7.3		0.7	32.5	10.8		2.2	0.7	4.0	0	3.1	30.0	72.5	34.5	-4.2	+14.9	4.8	83.2	48.4	44.6	53.6	0	16.0	114.2	4.8	1.4	7.9	1.6	213.5					46.3		53.6
9.6		4.8	0.4	4.0	7.4	9.7	34.2	7.8		25.9	3.8	4.0	0	8.7	43.6	9.6		0.9	42.7	14.2		14.5	4.5	4.0	3.8	4.0	67.0	148.5	171.0	+3.4	+ 7.6	18.4	151.6	178.6	168.2	12.4	2.2	5.0	192.8	10.4	1.6	7.9	1.8	158.4					75.0		22.5
9.6		3.7	0.5	4.0	0.5	1.2	34.2	7.8		22.8	2.2	4.0	0	7.2	43.6	9.6		0.9	42.7	14.2		11.9	4.7	4.0	2.2	4.0	58.8	141.8	145.0	+0.4	+ 3.8	12.1	145.6	148.4	136.3	0	32.4	15.0	183.7	12.1	1.8	7.9	1.7	104.7					75.0		46.4
9.6		1.7	0.5	4.0	0.5	2.3	34.2	7.8		5.5	0	4.0	0	1.1	34.6	7.6		0.7	33.9	11.3		5.0	5.6	4.0	0	4.0	17.3	67.8	58.2	-1.3	+ 6.6	5.4	75.1	64.8	59.4	0	35.1	14.0	108.5	5.4	1.6	7.9	1.5	62.8					63.5		49.2
9.2		1.0	0.3	4.0	0.3	1.2	21.8	5.0		2.6	0	2.6	0	0.7	21.1	4.6		0.4	20.7	6.9		2.6	3.0	4.0	0	2.6	2.3	35.2	25.8	-0.8	+ 5.9	5.2	40.3	33.9	28.5	0	0.9	0	29.4	5.2	1.4	2.4	1.0	66.1					32.7		1.3
41.4		16.9	4.6	48.0	15.9	30.4	333.9	76.1		69.4	6.0	21.1	2.5	24.1	349.6	76.8		7.2	342.4	113.8		48.5	42.1	50.5	6.0	21.1	193.6	722.7	539.6	-17.9	+28.9	52.6	803.7	658.1	548	87.5	75.6	60.0	787.7	42.3	15.0	45.9	11.5	—	0	0		606.6	0		193.5
9.4		0.4	0.3	4.0	0.3	1.2	22.3	5.1		1.4	0	1.4	0	0.7	21.6	4.8		0.4	21.2	7.0		1.9	2.7	4.0	0	1.4	2.3	33.5	15.2	-2.0	+ 7.9	1.6	39.4	23.1	21.5	0	0.6	2.0	24.1	1.6	1.1	2.0	0.7	78.0					34.1		0.6
7.9		0.4	0.4	4.0	0.4	1.0	18.8	4.3		1.7	0	0	0.5	0.6	19.4	4.3		0.4	19.0	6.3		1.6	4.5	4.5	0	0	2.0	31.6	17.0	-1.6	+ 6.6	2.0	38.6	22.6	1.4	0	0	0	1.4	0	0.9	0.1	0.4	111.7					33.6		0
8.3		0.4	0.3	4.0	0.3	1.0	19.7	4.5		1.0	0	0	0.5	0.6	19.6	4.3		0.4	19.2	6.4		1.5	3.6	4.5	0	0	2.0	30.8	14.9	-1.7	+ 4.8	2.3	39.7	19.7	1.7	0	0	0	1.7	0	1.0	0.2	0.3	142.6					34.8		0
7.5		0.2	0.4	4.0	0.4	1.0	18.2	4.1		0.8	0	0	0.5	1.0	33.5	7.4		0.7	32.8	10.9		1.4	4.5	4.5	0	0	3.5	46.7	12.1	-3.8	+ 8.1	0.9	51.0	20.2	1.8	0	0	0	1.8	0	1.0	0.2	0.4	190.4					55.4		0
7.5		0.3	0.3	4.0	0.3	1.8	34.2	7.8		0.8	0	0	0.5	1.0	33.5	7.4		0.7	32.8	10.9		1.1	2.7	4.5	0	0	3.5	44.6	10.9	-3.7	+ 3.0	1.8	43.7	18.9	1.5	0	0	0	1.5	0	0.9	0.2	0.4	231.5					51.3		0
7.3		0.3	0.5	4.0	0.5	1.5	29.2	6.7		1.0	0	0	0.5	0.7	28.8	6.3		0.6	28.2	9.4		1.1	4.5	4.0	0	3.0	3.0	41.6	14.5	-3.0	+ 4.6	5.6	43.7	19.1	1.4	0	0	0	1.4	0	1.1	0.2	0.5	271.7					41.4		0
7.7		0.3	0.2	4.0	0.2	1.0	18.2	4.1		1.1	0	1.1	0	0.5	17.7	3.9		0.4	17.3	5.7		1.1	2.2	4.0	0	1.9	1.9	22.6	16.8	-1.2	+ 1.9	4.2	25.3	18.7	14.5	25.9	0	9.0	49.4	4.2	1.2	6.4	1.1	244.1					31.9		25.9
8.0		4.1	0.1	4.0	3.9	1.8	34.2	7.8		5.0	0	4.0	0	1.8	33.4	7.3		0.7	32.7	10.9		4.4	0.7	4.0	0	4.0	4.3	50.1	60.6	+1.2	- .58	44	45.5	58.8	50.4	51.3	27.9	17.0	146.6	44	1.4	7.9	1.5	1357.					60.5		97.3
7.4		4.4	1.0	4.0	0.8	8.6	34.2	7.8		39.8	14.7	4.0	0	11.7	43.6	9.6		0.9	42.7	14.2		15.6	10.8	4.0	14.7	4.0	66.2	158.0	196.0	+4.2	+ 0.6	15.3	162.8	196.6	181.3	0	24.5	7.0	212.8	15.3	1.6	7.9	1.3	67.5					70.8		49.5
7.6		1.4	0.6	4.0	0.6	2.4	34.2	7.8		16.7	0.2	4.0	0	2.1	43.6	9.6		0.9	42.7	14.2		5.1	5.8	4.0	0.2	4.0	44.1	105.9	80.6	-2.8	- .42	8.5	98.9	76.4	67.9	0	46.7	20.0	134.8	8.5	1.8	7.9	1.0	20.3					75.0		77.4
7.6		1.4	0.6	4.0	0.6	2.4	34.2	7.8		4.7	0	4.0	0	1.0	33.9	7.5		0.7	33.2	11.0		2.2	6.2	4.0	0	4.0	36.3	99.3	46.8	-5.8	-1.62	2.1	77.3	30.6	23.5	0	19.8	15.0	88.3	7.1	1.6	0	0.6	0					57.5		75.9
8.1		1.1	0.5	4.0	0.5	1.3	24.0	5.5		4.4	0	4.0	0	2.7	23.7	5.2		0.5	23.2	7.7		2.8	5.4	4.0	0	4.0	2.5	41.9	32.2	-0.5	- .96	5.1	31.8	27.6	22.5	0	0	1.0	23.5	5.1	1.4	0	0	1.8					32.8		1.0
41.5		15.6	5.2	48.0	14.8	25.8	337.4	77.0		77.4	14.9	22.5	2.5	22.6	352.3	77.6		7.3	345.0	114.6		39.8	53.9	50.5	14.9	22.5	171.6	711.6	522.6	-20.7	+ 1.7	52.8	692.6	528.3	489.4	77.2	149.7	71.0	687.3	46.2	15.0	33.0	2.4	—	0	0		579.1	0		338.0
9.4		0.8	0.3	4.0	0.3	1.2	23.4	5.3		1.7	0	1.7	0	0.7	22.7	5.0		0.5	22.2	7.4		2.1	3.3	4.0	0	1.7	2.4	25.7	22.4	-1.5	- 6.5	2.2	27.7	15.9	13.7	0	0	1.0	14.7	2.2	1.1	0	0.1	11.4					24.0		4.5
7.9		0.5	0.4	4.0	0.4	1.0	18.8	4.3		1.6	0	0	0.5	0.6	19.3	4.2		0.4	18.9	6.3		1.7	4.0	4.5	0	0	2.0	31.1	18.2	-1.4	+ 0.5	2.8	30.2	18.7	4.5	0	0	0	4.5	0	0.9	0	0.1	36.1					32.5		0
8.4		0.2	0.5	4.0	0.5	1.1	20.0	4.6		1.0	0	0	0.5	0.6	19.9	4.4		0.4	19.5	6.5		1.6	5.5	4.5	0	0	2.1	32.2	14.7	-2.0	+ 0.4	1.7	32.1	15.6	4.6	0	0	0	4.6	0	1.0	0	0.1	62.8					34.2		0
7.6		0.3	0.4	4.0	0.4	1.0	18.2	4.1		0.9	0	0	0.5	0.6	18.0	4.0		0.4	17.6	5.8		1.5	3.8	4.5	0	0	2.0	29.4	13.2	-1.8	+ 4.7	2.1	42.3	27.9	4.9	0	0	0	4.9	0	1.0	0.4	0.3	98.7					32.6		0
8.5		0.3	0.3	4.0	0.3	1.8	34.2	7.8		0.8	0	0	0.5	1.0	33.5	7.4		0.7	32.8	10.9		1.2	3.6	4.5	0	0	3.5	45.6	11.8	-3.7	8.2	2.5	50.1	20.0	4.7	0	0	0	4.7	0	0.9	0.4	0.3	142.9					53.7		0
8.5		0.3	0.4	4.0	0.4	1.8	34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.3	3.8	4.5	0	0	3.5	46.0	12.6	-3.6	10.6	5.2	53.0	24.2	4.7	0	0	0	4.7	0	1.1	0.5	0.4	189.7					49.1		0
8.5		0.7	0.2	4.0	0.2	1.8	34.2	7.8		1.3	0	1.3	0	1.0	33.2	7.3		0.7	32.5	10.8		1.6	1.8	4.0	0	1.3	3.5	44.7	18.4	-2.9	45.1	11.6	86.9	68.5	51.9	10.2	0	0	62.1	11.6	1.2	7.2	0.9	200.2					55.7		10.2
7.0		3.1	0.3	4.0	1.6	1.8	34.2	7.8		13.0	0	4.0	0	1.8	41.9	9.2		0.8	41.1	13.6		6.8	5.3	4.0	0	4.0	3.9	64.8	69.5	+0.5	36.8	11.7	103.1	106.3	94.6	8.0	0	0	6.0	108.6	11.7	1.4	7.9	1.3	172.9					58.7		58.0
8.7		3.5	0.3	4.0	2.2	1.8	34.2	7.8		15.2	0.2	4.0	0	1.6	43.6	9.6		0.9	42.7	14.2		8.9	2.9	4.0	0.2	4.0	4.3	67.0	100.0	+3.4	15.6	12.5	96.5	115.6	102.1	12.9	0	12.0	127.0	12.5	1.4	7.9	1.6	128.4					59.6		12.9
7.5		2.0	0.4	4.0	0.4	1.8	34.2	7.8		13.6	0	4.0	0	1.3	42.5	9.4		0.8	41.7	13.8		5.3	4.6	4.0	0	4.0	3.9	63.6	76.2	+1.4	21.5	9.3	96.4	97.7	88.4	4.0	0	17.0	144.4	9.3	1.8	7.9	1.5	51.8					60.6		43.0
7.4		1.0	0.5	4.0	0.5	1.8	34.2	7.8		4.3	0	4.0	0	1.0	33.3	7.4		0.7	32.8	10.9		2.6	5.4	4.0	0	4.0	3.5	52.3	44.1	-0.7	11.7	7.5	63.3	57.8	50.3	9.5	15.8	7.0	73.6	7.5	1.6	5.6	1.0	31.4					53.5		26.6
7.9		0.9	0.5	4.0	0.5	1.7	33.0	7.5		3.9	0	3.9	0	1.0	32.3	7.0		0.6	31.4	10.4		2.0	5.3	4.0	0	3.9	3.3	49.9	31.5	-2.0	10.2	5.8	58.1	41.7	35.9	0	0.5	8.0	38.4	5.8	1.4	0	0.6	42.8					45.3		0.9
47.8		14.0	4.7	48.0	7.7	18.6	352.8	80.4		58.2	0.2	22.9	2.5	11.7	373.7	82.3		7.6	366.1	121.5		36.3	49.3	50.5	0.2	22.9	37.9	563.8	435.6	-14.1	16.3	75.9	718.4	604.9	460.3	74.6	16.3	41.0	692.2	61.6	15.0	37.8	8.1	—					573.1	0		163.1
9.8		0.7	0.4	4.0	0.4	1.0	18.5	4.2		2.3	0	2.3	0	0.6	17.9	3.9		0.4	17.5	5.8		1.9	4.6	4.0	0	2.3	2.0	32.3	24.7	-0.8	4.1	2.5	35.6	28.8	26.3	0	0	2.0	29.3	2.5	1.1	2.1	0.6	46.4					33.9		0
7.8		0.5	0.6	4.0	0.6	1.0	18.7	4.3		2.3	0	0	0.5	0.6	19.5	4.4		0.4	19.8	6.5		1.6	4.3	4.5	0	0	2.0	33.9	22.0	-1.3	8.1	2.8	40.7	30.1	3.8	0	0	2	3.8	0	0.9	0.2	0.4	32.5					33.6		0
8.2		0.5	0.6	4.0	0.6	1.0	19.9	4.5		1.4	0	0	0.5	0.6	20.2	4.4		0.4	19.8	6.6		1.6	6.4	4.5	0	0	2.0	34.3	20.0	-1.6	12.5	1.9	45.2	32.5	3.6	0	0	0	3.6	0	1.0	0.4	0.3	170.7					38.4		0
8.4		0.3	0.5	4.0	0.5	1.8	34.2	7.8		1.1	0	0	0.5	1.0	33.8	7.4		0.7	33.1	11.0		1.4	5.7	4.5	0	0	3.5	43.2	16.3	-3.5	8.0	2.6	51.7	24.3	3.5	0	0	0	3.5	0	1.0	0.4	0.4	217.1					55.5		0
8.4		0.3	0.5	4.0	0.5	1.8	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.3	5.1	4.5	0	0	3.5	47.4	14.5	-3.6	7.2	6.0	51.0	21.7	3.5	0	0	0	3.5	0	1.1	0.4	0.5	262.7					56.7		0
8.5		0.4	0.3	4.0	0.3	1.8	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.3	4.4	4.5	0	0	3.5	44.1	14.2	-3.5	8.3	6.3	50.7	21.7	3.5	0	0	0	3.5	0	1.1	0.4	0.5	262.7					54.8		22.5
8.6		0.6	0.2	4.0	0.2	1.8	34.2	7.8		1.0	0	1.0	0	1.0	33.2	7.3		0.7	32.5	10.8		1.3	1.8	4.0	0	3.5	3.5	44.1	15.5	-3.1	+ 6.0	1.9	47.0	21.5	18.6	21.5	0	0	39.1	2.9	1.1	6.2	1.1	252.3					58.8		22.5
9.6		2.3	0.1	4.0	0.4	2.2	34.2	7.8		3.1	0	3.1	0	1.0	33.2	7.3		0.7	32.5	10.8		2.2	0.7	4.0	0	3.1	30.0	72.5	34.5	-4.2	+14.9	4.8	83.2	48.4	44.6	53.6	0	16.0	114.2	4.8	1.4	7.9	1.6	213.5					46.3		53.6
9.6		4.8	0.4	4.0	7.4	9.7	34.2	7.8		25.9

| | | SUGAR LOAF RESERVOIR | | | | | | | | ELBERT POWERPLANT | | | | | | | | | SHOWDEN DIVERSION | | | | | TWIN LAKES RESERVOIR | | | | | | | | | | | | | | | | WAPACO POWERPLANT | | | | WAPACO PRINCETON INTERCEPTION AND POWERPLANT | | | | | | | | JOHNSON POWERPLANT | | | | | | | | SALIDA POWERPLANT | | | |
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Total flow to Prince-ton Power Plant	Power generated at Prince-ton Power Plant	JOHNSON POWERPLANT: Chalk Creek 68.6 sq. mi.	Chalk Creek spills	Irrigation by-pass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 95 & Intercep-tion loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant	SALIDA POWERPLANT: Canal loss 95	Total flow thru Salida Power Plant	Power generated at Salida Power Plant	SALIDA GAGE: Cottonwood Creek 71.0 sq. mi.	489.8 sq. mi. uncontrolled area	Accumulated fish flows	Return of Chalk Creek spills (Col. 48)	Return of Chalk Creek Irr. by-pass (Col. 49)	Canal loss returns plus spills below Crowley	Project operation flow to Salida Gage	Historical recorded flow to Salida Gage	PUEBLO RESERVOIR OPERATION: Trans-portation loss 115	Gain between Salida and Pueblo	Historical div. of Reservoir Ditch	Project operation flow to Pueblo Reser-voir	Historical recorded flow to Pueblo Res.	Historical recorded flow re-produced below Pueblo Res.	Winter storage Arkansas R. water released	Project supple-mental irr. water released	Tempo-rary Pass water released	Total release thru Pueblo Power Plant	Historical Assessment Ditch Diver. released	Valley municipal water release	Power generated at Pueblo Power Plant	Reser-voir evapo-ration	Reser-voir content end of month	Project winter spills	Winter Arkansas River water spills	Total power generated at all Power Plants	Flood flows stored		Pre-Project Ana-pte shortage
(44) 13/	(45)	(46)	(47)	(48) 14/	(49) 15/	(50) 16/	(51)	(52) 17/	(53)	(54)	(55) 18/	(56)	(57)	(58)	(59) 19/	(60)	(61)	(62) 20/	(63)	(64) 21/	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73) 22/	(74) 23/	(75)	(76)	(77)	(78) 24/	(79) 24/	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)
199	46	2.0	0	2.0	0	0.6	199	42	0.4	18.9	4.3	2.1	4.0	4.0	0	2.0	2.0	38.0	21.5	-1.3	+ 3.3	1.8	40.0	228	22.0	0	0	1.0	23.0	1.8	1.1	6	0.8	42.6				23.9				0
189	43	2.4	0	0	0.5	0.6	20.2	44	0.4	19.8	4.6	1.9	6.4	4.5	0	0	2.0	34.6	21.2	-1.5	+ 11.7	1.0	44.8	22.9	3.3	0	0	0	3.3	0	A9	0.2	0.4	27.8				23.8				0
187	45	1.4	0	0	0.5	0.6	19.7	43	0.4	19.3	4.4	1.7	4.0	4.5	0	0	2.0	34.5	15.5	-1.8	+ 14.3	0.5	49.0	29.8	3.6	0	0	0	3.6	0	1.0	0.3	0.3	134.3				24.7				0
182	41	1.0	0	0	0.5	0.6	18.1	40	0.4	17.7	3.9	1.5	4.5	4.5	0	0	2.0	50.2	15.2	-1.6	+ 9.8	2.0	34.4	25.0	3.3	0	0	0	3.3	0	1.0	0.3	0.3	146.1				22.6				0
342	78	1.9	0	0	0.5	1.0	35.6	78	0.7	34.9	7.9	1.3	3.8	4.5	0	0	3.9	46.4	12.8	-3.7	+ 6.7	6.0	49.4	19.5	3.0	0	0	0	3.0	0	0.9	0.3	0.4	246.2				55.8				0
342	78	1.1	0	0	0.5	1.0	33.8	74	0.7	33.1	11.0	1.5	4.5	4.5	0	0	3.9	47.5	14.1	-3.5	+ 2.9	5.8	46.9	19.0	3.4	0	0	0	3.4	0	1.0	0.4	0.5	246.1				55.1				0
342	78	1.4	0	1.4	0	1.0	33.2	73	0.7	32.5	10.8	1.4	2.8	4.0	0	1.4	3.8	46.7	16.1	-3.3	+ 10.1	4.2	53.7	24.2	22.0	2.4	0	6.0	36.4	4.2	1.2	4.6	1.0	267.8	0	0.2		52.7				2.4
342	78	1.0	0	4.0	0	1.2	39.0	85	0.9	38.1	12.0	5.1	4.5	4.0	0	0	3.9	42.2	4.1.3	-0.1	+ 4.4	6.0	46.5	6.57	5.97	3.9	0	12.0	25.6	6.0	1.4	7.9	1.5	293.8				53.9				3.9
342	78	25.9	11.3	4.0	0	11.2	99.6	96	0.9	98.7	11.5	18.1	7.0	4.0	11.3	4.0	14.7	103.8	15.0	+ 5.9	+ 242.9	1.7	352.6	377.9	182.2	70.8	0	15.0	268.0	1.7	1.6	3.9	2.0	345.1				58.8	21.0			3.8
342	78	21.7	1.7	4.0	0	6.6	98.6	96	0.9	97.7	11.2	9.1	6.0	4.0	1.7	4.0	18.4	86.2	10.0	+ 2.0	+ 22.7	3.1	160.9	176.7	123.6	16.7	52.6	0	222.9	3.1	1.8	7.9	2.8	448.4				60.0				62.4
287	65	4.3	0	4.0	0	0.9	28.1	62	0.6	27.5	9.1	4.1	4.5	4.0	0	4.0	3.0	67.1	16.8	-0.3	+ 4.7	8.9	74.0	72.0	53.1	0	25.4	11.0	119.5	8.9	1.6	7.9	2.7	340.7				48.0				35.5
207	47	3.5	0	3.5	0	0.6	20.1	44	0.4	19.7	6.5	3.0	4.5	4.0	0	2.5	2.1	34.2	12.3	-0.4	+ 8.5	7.7	44.3	44.8	33.1	0	0	0	33.1	7.7	1.4	4.0	2.1	240.7				32.8				0
3 331.3	754	76.3	13.0	22.9	2.5	25.9	353.3	77.6	7.3	346.0	114.9	51.7	55.5	50.5	13.0	22.9	65.0	604.6	517.0	-36	+459.5	48.7	1070.6	957.3	577.9	99.8	58.0	65.0	800.7	32.4	15.0	44.7	14.5	—	0	0.2		533.2	3/4.0			181.0
218	50	2.4	0	2.4	0	0.7	21.1	46	0.4	20.7	6.9	2.0	4.8	4.0	0	2.4	2.2	36.1	26.5	-1.2	+ 3.2	1.8	38.1	28.7	26.9	0	0	0	26.9	1.8	1.1	3.2	1.5	247.5				33.9				0
180	41	2.6	0	0	0.5	0.6	19.5	43	0.4	19.1	6.3	1.5	2.1	4.5	0	0	2.0	34.2	24.4	-1.1	+ 8.5	0.4	41.6	32.9	10.0	0	0	0	10.0	0	0.9	1.2	1.1	247.1				35.2				0
196	45	1.5	0	0	0.5	0.6	20.0	44	0.4	19.6	6.5	1.5	5.8	4.5	0	0	2.0	33.4	21.7	-1.3	+ 14.5	0	46.6	34.2	10.0	0	0	0	10.0	0	1.0	1.3	0.5	282.2				35.2				0
190	43	1.2	0	0	0.5	0.6	19.1	42	0.4	18.7	6.2	1.4	5.3	4.5	0	0	2.0	31.9	16.8	-1.7	+ 12.3	0	46.5	29.1	10.0	0	0	0	10.0	0	1.0	1.3	0.6	319.1				32.6				0
149	34	1.0	0	0	0.5	0.5	14.9	33	0.3	14.6	4.8	1.2	4.2	4.5	0	0	1.6	26.1	14.4	-1.3	+ 14.5	6.1	39.3	28.4	10.0	0	0	0	10.0	0	0.9	1.4	0.6	346.9				27.8				0
156	34	1.1	0	0	0.5	0.5	15.9	35	0.3	15.6	5.2	1.2	3.5	4.5	0	0	1.6	24.4	15.2	-1.2	+ 11.9	6.1	36.1	26.1	10.2	0	0	0	10.2	0	1.1	2.7	0.6	358.8	0	183		28.5				0
173	39	1.3	0	1.3	0	0.5	16.8	37	0.3	16.5	5.6	1.2	2.7	4.0	0	1.3	1.7	22.4	17.3	-1.0	+ 4.0	5.5	30.4	24.7	16.4	0	12.9	10.0	85.3	5.5	1.2	7.7	1.3	246.3	2.4	742		18.1				24.4
342	78	110	0	4.0	0	11.2	99.0	78	0.9	98.2	13.0	5.9	4.6	4.0	0	4.0	18.4	25.3	76.9	+ 8.2	+ 1.4	6.2	76.7	78.3	73.1	0	38.0	14.0	125.1	6.2	1.4	7.9	1.5	170.0	0	0		64.6				33.2
342	78	22.3	2.1	4.0	0	6.8	43.6	96	0.9	42.7	14.2	4.6	4.5	4.0	2.1	4.0	5.4	108.7	13.2	-1.8	+ 4.7	16.7	157.8	136.9	120.2	0	17.9	19.0	157.1	16.7	1.6	7.9	1.7	164.7				71.0				15.1
342	78	17.0	0.4	4.0	0	3.2	43.6	96	0.9	42.7	14.2	4.6	4.0	4.0	0.4	4.0	4.2	108.7	26.7	-1.9	- 7.3	6.3	79.5	79.4	73.1	0	55.1	14.0	142.2	6.3	1.4	7.9	1.5	102.1				72.9				77.1
342	78	3.5	0	3.5	0	1.0	33.2	73	0.7	32.5	10.8	3.9	4.5	4.0	0	3.5	4.2	53.2	19.3	-0.5	+ 7.1	7.2	57.8	58.4	41.2	0	52.6	0	105.8	7.2	1.4	7.9	1.6	50.7				47.8				70.7
241	50	2.5	0	2.5	0	0.7	21.1	46	0.4	20.7	6.9	2.0	3.2	4.0	0	2.5	2.2	34.6	25.5	-1.0	+ 2.3	4.3	35.7	32.8	23.5	0	2.2	0	30.7	4.3	1.4	2.4	0.9	48.3				32.8				11.5
2 285.0	65.0	67.4	2.5	21.7	2.5	16.9	308.8	67.9	6.2	302.6	100.5	37.1	56.1	50.5	2.5	21.7	138.3	631.0	505.3	-13.8	+763	60.3	693.5	581.6	430.6	0	195.7	57.0	483.3	48.0	15.0	53.7	13.7	—	7.4	185		522.2	0			57.0
188	43	1.5	0	1.5	0	0.6	18.2	40	0.4	17.8	5.9	1.4	3.2	4.0	0	1.5	2.0	28.9	17.7	-0.1	-1.0	4.6	28.2	16.7	15.1	0	3.0	0	18.1	1.6	1.1	1.4	0.6	58.7				34.2				4.2
191	44	1.9	0	0	0.5	0.6	19.9	44	0.4	19.5	6.5	1.5	5.1	4.5	0	0	2.0	32.6	18.0	-1.6	+ 8.9	1.9	37.9	24.9	1.6	0	0	0	1.6	0	0.9	0.1	0.4	92.7				34.1				0
201	46	1.1	0	0	0.5	0.6	20.1	44	0.4	19.7	6.5	1.6	5.0	4.5	0	0	2.1	32.9	16.3	-1.8	+ 10.1	3.0	41.2	26.4	1.4	0	0	0	1.4	0	1.0	0.1	0.3	131.2				35.0				0
186	42	1.0	0	0	0.5	0.6	18.5	41	0.4	18.1	6.0	1.4	4.3	4.5	0	0	2.0	30.3	14.5	-1.7	+ 5.7	2.9	34.3	20.2	1.4	0	0	0	1.4	0	1.0	0.1	0.3	162.8				32.9				0
241	55	0.8	0	0	0.5	1.0	22.5	50	0.7	21.8	10.9	1.1	4.0	4.5	0	0	3.9	46.3	12.3	-3.7	+ 3.9	2.8	46.5	16.2	1.3	0	0	0	1.3	0	0.9	0.1	0.4	246.7				28.5				0
347	79	1.0	0	0	0.5	1.0	32.7	74	0.7	32.0	11.0	1.2	4.4	4.5	0	0	3.9	47.0	16.7	-3.6	+ 2.7	8.9	47.1	17.9	1.5	0	0	0	1.5	0	1.1	0.2	0.5	250.7				28.6				0
248	46	1.3	0	1.3	0	0.6	19.6	43	0.4	19.2	6.4	1.3	2.6	4.0	0	1.3	2.1	30.5	18.5	-1.8	+ 2.4	4.2	32.6	21.9	17.7	6.7	0	4.0	22.4	4.2	1.2	3.6	1.0	274.6				32.0				6.7
343	78	1.1	0	0	0.5	1.0	32.7	74	0.7	32.0	11.0	1.2	4.7	4.5	0	0	3.9	47	2.7	4.0	0	4.0	5.0	56.9	54.8	0	+ 9.3	6.6	64.2	6.4	1.4	7.9	1.5	222.1				68.0				16.6
343	78	5.1	0	4.0	0	1.2	32.8	74	0.7	32.1	11.0	1.3	2.9	4.0	2.6	4.0	3.4	104.9	13.0	+1.7	+ 16.0	18.7	136.1	140.0	121.3	6.1	0	0	127.4	18.7	1.6	7.9	1.9	198.6				65.2				6.4
342	78	23.3	2.6	4.0	0	7.4	42.6	96	0.9	42.7	14.3	4.8	4.5	4.0	2.9	4.0	5.4	123.2	11.2	-1.2	+ 57.0	12.0	181.0	171.0	159.0	2.4	0	0	161.4	12.0	1.2	7.9	2.0	202.4				68.9				2.4
342	78	23.7	2.7	4.0	0	7.4	42.6	96	0.9	42.7	14.3	4.8	4.5	4.0	2.9	4.0	5.4	123.2	11.2	-0.5	+ 47.8	8.4	136.7	133.3	12.4	23.4	0	0	35.8	8.4	1.4	4.2	2.3	272.3				65.2				22.6
341	78	6.7	0	4.0	0	1.1	35.8	79	0.7	35.1	11.7	4.9	4.5	4.0	0	4.0	4.2	69.3	66.5	-0.4	+ 47.8	6.4	136.7	133.3	12.4	23.4	0	0	35.8	6.4	1.4	4.2	2.3	272.3				64.3	11.43			22.6
341	49	4.8	0	4.0	0	0.7	31.4	44.7	0.4	21.0	7.0	3.6	5.6	4.0	0	4.0	2.2	40.4	39.2	-0.1	+ 35.2	0.8	76.5	74.4	72.6	1.1	0	0	174.7	0.5	1.4	7.9	2.6	258.4		30.4		37.1				41
2 283.3	73.8	76.2	5.5	22.8	2.5	22.6	348.1	76.0	7.0	332.1	112.4	50.3	61.6	54.5	5.5	22.8	128.9	647.7	509.0	-13.8	+222.0	66.0	858.9	731.0	465.8	56.3	3.0	11.0	586.1	50.5	15.0	44.4	12.8	—	0	30.4		544.8	114.3			60.6
190	43	3.5	0	3.5	0	0.6	18.4	40	0.4	18.0	6.0	3.4	4.3	4.0	0	1.5	2.0	32.2	33.2	-0.4	+34.6	6.4	71.4	67.8	64.4	0	0.3	0	64.7	6.4	1.1	7.9	1.8	252.8		0		33.9				0.4
186	42	2.4	0	0	0.5	0.6	19.9	44	0.4	19.5	6.5	2.3	4.2	4.5	0	0	2.0	34.6	25.3	-1.0	+ 12.4	1.5	46.9	43.7	22.8	0	0	0	22.8	0	0.9	3.0	1.2	294.5		0		33.6				0
188	43	1.3	0	0	0.5	0.6	19.0	42	0.4	18.6	6.2	1.4	3.5	4.5	0	0	2.0	32.0	19.3	-1.4	+ 18.9	2.3	42.9	38.2	23.8	0	0	0	23.8	0	1.0	3.2	0.6	319.5		0		34.8				0
167	38	1.1	0	0	0.5	0.5	16.8	37	0.3	16.5	5.5	1.2	4.8	4.5	0	0	1.7	28.0	14.1	-1.4	+ 13.3	2.4	36.9	29.4	24.1	0	0	0	24.1	0	1.0	3.3	0.6	334.6		0		32.8				0
144	33	1.0	0	0	0.5	0.4	14.5	32	0.3	14.2	4.7	1.1	4.3	4.5	0	0	1.5	26.9	14.6	-1.2	+ 18.4	1.3	43.1	33.0	23.8	0	0	0	23.8	0	0.9	3.2	0.6	350.8	0	1.5		28.1				0
158	36	1.0	0	0	0.5	0.5	16.8	36	0.3	16.5	5.1	1.2	4.7	4.5	0	0	1.6	27.6	16.8	-1.4	+ 13.4	6.1	39.3	28.3	24.0	0	0	0	24.0	0	1.1	3.4	0.7	350.8	0	13.4		32.0	0			0
167	36	1.6	0	1.6	0	0.5	15.2	33	0.3	14.9	4.9	1.1	3.1	4.0	0	1.6	1.9	26.9	22.3	-0.5	+ 15.9	2.7	42.3	37.9	23.8	0	10.2	0	57.9	2.9	1.2	7.9	1.3	253.1	84.1	348		31.9				14.3
241	78	7.6	0	4.0	0	1.2	33.6	75	0.3	33.3	13.5	5.2	4.5	4.0	2.2	4.0	3.8	58.2	74.4	-2.1	+ 31.7	16.4	123.8	116.4	113.7	0	8.2	10.0	107.9	16.4	1.4	7.9	1.5	248.7	0	0		46.9				11.5
341	78	22.8	2.2	4.0	0	7.2	42.6	96	0.9	42.7	14.2	4.8	4.5	4.0	2.2	4.0	6.0	158.3	150.0	-9.5	+ 41.6	13.2	185.4	179.6	178.8	0	25.8	16.0	220.4	13.2	1.6	7.9	2.0	207.1	0	0		72.5				24.6
342	78	12.4	0	4.0	0	1.3	41.0	90	0.8	40.2	12.3	4.6	4.5	4.0	0	4.0	5.2	90.7	76.2	-1.6	- 1.6	5.6	87.5	79.6	63.0	0	26.1	15.0	132.1	5.6	1.4	7.9	2.1	166.0	0	0		71.1				42.6
242	28	2.2	0	2.2	0	1.0	33.2	73	0.7	32.5	10.8	4.7	4.5	4.0	0	2.2	1.4.5	48.0	18.3	0	+ 0.2	8.7	58.2	38.5	49.8	0	32.1	5.0	86.9	8.7	1.6	7.9	2.0	188.0	0	0		42.0				44.3
220	50	2.1	0	2.1	0	0.7	21.3	46.7	0.4	20.9	6.9	1.8	3.7	4.0	0	2.1	2.3	33.8	18.7	-1.7	+ 1.1	4.1	33.2	17.8	15.7	0	1.5	3.0	20.2	4.1	1.4	2.1	1.5	131.0	0	0		32.7				2.1
9 277.3	63.3	60.7	2.2	21.4	2.5	15.1	297.3	65.4	6.0	291.3	96.6	43.8	49.1	50.5	2.2	21.4	160.3	642.1	522.9	+22	235.9	76.7	8' <8	758.8	631.4	0	115.2	48.0	794.6	44.4	15.0	47.8	15.9	—	84.1	49.2		531.3	0			161.3
181	41	1.7	0	1.7	0	0.6	19.6	3.9	0.4	19.2	5.7	1.6	3.5	4.0	0	1.7	1.9	29.9	19.1	-1.2	+ 2.3	2.2	31.0	21.4	19.7	0	0	1.0	20.2	2.2	1.1	2.1	1.1	137.4				33.8				0
186	43	1.6	0	0	0.5	0.6	19.1	4.2	0.4	18.7	6.2	1.5	4.0	4.5	0	0	2.0	30.7	17.5	-1.5	+ 5.1	1.9	34.3	22.6	3.6	0	0	0	3.6	0	0.9	0.4	0.5	146.4				32.6				0
190	45	1.1	0	0	0.5	0.6	19.6	4.3	0.4	19.2	6.4	1.4	3.9	4.5	0	0	2.0	31.0	15.4	-1.7	+ 4.2	2.8	35.5	21.6	3.8	0	0	0	3.8	0	1.0	0.4	0.4	196.7				34.8				0
181	41	1.0	0	0	0.5	0.6	18.0	4.0	0.4	17.6	5.8	1.4	4.2	4.5	0	0	2.0	29.7	14.6	-1.7	+ 10.1	2.7	38.1	24.7	4.2	0	0	0	4.2	0	1.0	0.5	0.4	2232.2				32.6				0
162	37	0.8	0	0	0.5	0.5	16.0	3.5	0.3	15.7	5.2	1.1	3.7	4.5	0	0	1.7	26.7	11.7	-1.6	+ 7.3	4.5	32.4	19.0	3.7	0	0	0	3.7	0	0.9	0.5	0.5	256.5				28.8				0
208	47	0.9	0	0	0.5	0.6	20.6	4.5	0.4	20.2	6.7	1.7	5.4	4.5	0	0	2.1	34.0	13.1	-2.0	+ 7.3	5.0	36.9	22.4	4.0	0	0	0	4.0	0	1.1	0.5	0.5	287.6	0	0		30.0				0
171	39	6.9	0	0.9	0	0.5	16.6	3.7	0.3	16.3	5.4	1.0	1.7	4.0	0	0.9	1.7	23.6	15.1	-1.2	- 1.8	4.0	21.6	12.3	8.3	24.3	21	8.0	48.7	4.0	1.2	7.9	1.1	248.8	0	11.4		22.1				36.7
342	78	6.3	0	4.0	0	1.1	35.9	78	0.8	34.7	11.5	4.5	4.5	4.0	0	4.0	4.7	53.5	51.2	-0.8	- 8.4	6.9	44.6	42.4	25.7	37.4	15.2	15.0	103.3	6.9	1.4	7.9	1.5	196.3	0	0		59.4				43.7
342	78	9.0	0	4.0	0	1.2	38.0	84	0.8	37.2	12.4	5.1	2.4	4.0	0	4.0	22.4	75.1	25.6	+0.1	- 5.0	5.6	70.2	74.6	45.0	0	63.8	14.0	148.8	5.6	1.4	7.9	1.5	89.0				58.1				25.5
342	78	15	0	4.0	0	1.2	36.8	81	0.7	36.1	12.0	4.8	2.3	4.0	0	4.0	14.8	66.0	57.7	-0.7	+ 14.3	10.4	79.6	74.0	43.6	0	52.6	16.0	130.2	10.4	1.8	7.9	1.8	85.0				60.9				74.9
342	78	4.0	0	4.0	0	1.0	33.2	73	0.7	32.5	10.8	4.5	4.4	4.0	0	4.0	22.9	72.9	39.0	-4.3	+ 11.0	9.4	83.7	50.0	40.6	0	41.9	14.0	96.6	9.4	1.4	0	0.6	0.6				58.0				18.6
23.9	5.4	3.3	0	3.3	0	0.7	23.2	5.1	0.5	22.7	7.5	2.8	3.9	4.0	0	3.3	2.5	39.2	28.4	-1.2	+ 7.1	7.1	45.1	36.5	23.4	0	0	4.0	32.4	7.1	1.4	0	0.1	4.7				38.7				0
7 289.2	65.8	32.1	0	21.9	2.5	7.8	294.1	64.8	6.0	288.1	95.6	29.7	39.0	50.5	0	21.9	86.5	515.7	340.4	-17.2	+543	60.5	552.8	447	280.1	61.7	178.6	76.0	579.4	45.6	15.0	36.0	9.7	—	0	11.4	—	492.9	0			313.2

17/ Col. 44 / 47 - 48 - 49 - 50 - 51.
18/ Col. 52 - 54.
19/ Col. 41 / 50.
20/ Cols. 58 / 48 / 51 / 56.
21/ Includes any spills in Col. 58.
22/ Winter releases include Pueblo municipal water and other measurable winter flows.
23/ Winter storage less Pueblo Reservoir evaporation for preceding year.
24/ Does not go through Power Plant.

NOTE:
Water in thousands of acre-feet.
Power in millions of kilowatthours.

DEC. -48

		SUGAR LOAF RESERVOIR								ELBERT POWERPLANT								SNOWDEN DIVERSION				TWIN LAKES RESERVOIR										WAPACO POWERPLANT				WAPACO INTERCEPTION AND PRINCETON POWERPLANT								JOHNSON POWERPLANT								SALIDA POWERP
Water year	Month	Inflow from Frying-pan Diver.	Lake Fork of Arkansas River	Irrigation release for Lake Fork lands	Fish release for Lake Fork	Release to Elbert Canal	Reservoir evaporation	Reservoir content end of month	Reservoir spills	Halfmoon Creek 34.9 sq. mi.	Halfmoon Creek spills	Irrigation by-pass Halfmoon Creek land	Elbert Canal loss	Total flow thru Elbert Power Canal	Power generated at Elbert Power Plant	Inflow from small existing tributaries and transmountain diver.	192.5 sq. mi. Arkansas R. drainage available at Snowden diver.	Fish flow passed at Snowden Diver.	Total available at Snowden Diver.	Twin Lakes (Independence Pass) Diver.	Lake Creek 106.0 sq. mi.	Total inflow to Twin Lakes	Fish flow released for domestic at Granite	Release to Granite Power Plant	Power generated at Granite Power Plant	Reservoir evaporation	Reservoir content end of month	Reservoir spills	Spills below Granite Power Plant	Clear Creek 87.7 sq. mi.	Total flow thru Wapaco Power Plant	Power generated at Wapaco Power Plant	79.9 sq. mi. above Granite Gage	88.5 sq. mi. above Wapaco Interception	Fish flow by-passed at Wapaco Interception	Wapaco Interception to Princeton Power Plant	Canal loss 8% & Interception loss	Total flow to Princeton Power Plant	Power generated at Princeton Power Plant	Chalk Creek 68.6 sq. mi.	Chalk Creek spills	Irrigation by-pass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 8% & Interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant	Canal loss 8%	Total flow thru Salida Power Plant
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)
				1/								2/						3/																				12/													
1925	Oct	2.7	1.0	0	0.3	13.7	0.3	102.1		0.8	0	0	1.8	16.2	6.8	0.1	3.8	1.8	4.2	Oct	0.4	3.3	24.1	1.6	15.9	8.7	6.8	222.5		3.2	1.5	30.6	8.4	0.6	0.2	4.0	0.4	1.0	24.0	4.6	2.2	0	2.2	0	0.6	18.4	4.3	0.4	19.0
	Nov	1.8	0.8	0	0.3	12.4	0.2	84.4		0.6	0	0	1.8	16.2	6.8	0	3.0	1.8	4.8	Nov.	0.3	2.6	22.4	1.7	16.3	8.8	6.9	206.4		1.3	1.3	19.4	7.9	0.5	0.5	4.0	0.5	1.0	18.7	4.3	2.0	0	2.0	0	0.5	17.8	4.4	0.4	19.4
	Dec	0.5	0.5	0	0.3	12.6	0.1	69.4		0.4	0	0	1.8	16.2	6.8	0	2.0	1.8	3.8	Dec.	0.2	1.9	20.5	1.8	17.6	8.9	6.2	207.3		1.2	1.8	20.6	8.4	0.4	0.5	4.0	0.5	1.1	24.0	4.6	1.2	0	1.2	0	0.5	20.1	4.4	0.4	19.7
1926	Jan	0.1	0.5	0	0.3	12.5	0.1	52.1		0.5	0	0	1.8	16.2	6.8	0	2.1	1.8	3.9	Jan.	0.2	1.9	20.7	1.8	16.3	8.9	6.2	203.5		0.9	1.8	18.8	7.6	0.4	0.4	4.0	0.4	1.0	18.2	4.7	1.0	0	1.0	0	0.5	17.5	4.0	0.4	17.9
	Feb	0	0.4	0	0.3	12.6	0.1	34.5		0.4	0	0	1.8	16.2	6.8	0	2.1	1.8	3.9	Feb.	0.1	1.6	20.0	1.8	16.4	7.8	6.2	173.4		0.8	1.2	16.0	6.6	0.3	0.3	4.0	0.3	2.1	24.2	4.7	0.8	0	0.8	0	0.5	17.2	3.9	0.4	17.5
	Mar	0.2	0.5	0	0.3	0	0.1	34.9		0.4	0	0	1.8	4.2	1.8	0	2.1	1.8	3.9	Mar.	0.1	1.8	5.0	1.8	5.8	2.5	1.8	164.4		0.8	1.5	3.6	1.5	0.2	0.1	4.0	0.1	2.1	7.5	1.7	0.2	0	0.2	0	0.5	1.0	0.2	0.1	3.8
	Apr	0.0	1.3	0	0.3	0	0.1	37.8		1.1	0	0	0	0.1	1.0	0.4	2.4	1.8	4.6	Apr.	0.4	3.5	8.5	1.8	5.3	2.3	1.8	332.2		2.0	2.8	5.0	2.2	0.3	0.2	4.0	0.2	2.0	9.2	1.9	0.3	0	0.3	0	0.5	1.0	0.2	0.2	7.5
	May	16.3	2.5	0.9	0	0	0.2	55.8		2.1	0	1.0	0.1	1.0	0.4	0.2	2.8	2.6	21.8	May	2.3	13.2	43.9	0	30.6	7.9	6.4	147.8		3.7	4.7	36.0	14.6	0.4	0.2	4.0	0.4	4.4	34.2	7.8	3.8	0	3.8	0	0.5	37.1	8.2	0.7	36.1
	June	28.8	13.2	0.9	0	0	0.5	100.8		3.7	2.3	1.0	0.5	26.9	9.4	0.7	5.0	4.3	30.0	June	2.7	23.6	96.2	0	78.8	4.7	0.3	217.6	a	0	15.0	1.3	46.0	14.6	0.3	0.2	5.1	0.3	5.2	34.2	7.8	1.1	0.4	0.4	0	1.0	43.6	9.6	0.9	42.1
	July	18.4	4.5	0.9	0	0.5	0.5	117.0		5.0	0.2	1.0	0.4	5.7	1.6	0.3	11.6	4.8	12.6	July	11.7	18.7	47.1	0.2	46.0	9.1	1.1	223.4	a	13.7	4.3	4.7	36.0	14.6	2.0	0.2	4.0	0.2	2.0	34.2	7.8	10.7	0	4.0	0	1.2	39.9	8.8	0.8	39.1
	Aug	6.1	1.1	0.9	0	1.5	0.5	117.0		2.0	0	1.0	0.2	2.3	1.0	0.1	4.3	1.8	6.7	Aug	2.7	7.3	19.0	1.1	27.3	6.4	4.3	218.7	a	0	4.1	1.4	32.8	12.3	1.1	0.4	6.0	0.4	1.7	34.5	7.9	3.5	0	3.5	0	0.9	30.6	6.7	0.6	30.6
1926	Sept	0	0.5	0.5	0	0	0.5	116.5		0.6	0	0	0.6	0	0	0	3.6	1.8	5.0	Sept.	1.1	2.2	6.3	1.6	21.3	5.0	1.1	155.6	a	0	2.2	1.0	24.5	9.7	0.6	0.3	4.0	0.3	1.2	23.6	5.4	2.3	0	2.3	0	0.7	22.9	5.0	0.5	22.4
Totals		77.1	27.5	4.1	2.1	89.1	5.0	—	0	22.6	2.5	6.6	18.3	94.3	39.7	1.5	38.0	25.1	81.9	—	49.1	95.4	326.8	14.3	306.3	71.6	7.4	—	0	132	44.7	149	358.7	149.1	15.3	4.0	48.0	11.2	26.6	537.4	77.0	52.2	8.7	21.2	2.5	13.3	357.9	77.5	7.2	344
1926	Oct	1.5	0.8	0	0.3	12.4	0.3	106.8		0.6	0	0	1.8	16.2	6.8	0	2.6	1.8	2.9	Oct	0.4	2.5	22.0	1.7	17.4	9.1	6.8	177.1		1.7	1.2	20.3	8.2	0.5	0.3	4.0	0.3	1.0	19.6	4.5	1.5	0	1.5	0	0.6	19.0	4.2	0.4	18.7
	Nov	0.9	0.6	0	0.3	13.5	0.2	84.9		0.5	0	0	1.8	16.2	6.8	0	2.5	1.8	3.8	Nov.	0.3	2.2	21.9	1.7	17.0	9.0	6.5	177.3		1.0	1.5	19.5	7.9	0.4	0.4	4.0	0.4	1.0	18.7	4.3	1.2	0	1.2	0	0.6	17.5	4.3	0.4	17.6
	Dec	0.7	0.6	0	0.3	13.5	0.1	69.7		0.5	0	0	1.8	16.2	6.8	0	2.5	1.8	3.8	Dec.	0.2	2.2	21.9	1.7	17.5	9.0	6.5	204.1		1.1	1.7	20.3	8.2	0.4	0.5	4.0	0.5	1.0	19.8	4.5	1.2	0	1.2	0	0.6	19.5	4.5	0.4	19.2
1927	Jan	0.9	0.5	0	0.3	13.5	0.1	59.7		0.5	0	0	1.8	16.2	6.8	0	2.2	1.8	3.8	Jan.	0.2	1.9	20.9	1.8	16.7	8.8	6.3	204.1		1.1	1.7	18.9	7.7	0.4	0.5	4.0	0.5	1.0	18.4	4.4	1.1	0	1.1	0	0.6	18.4	4.2	0.4	18.0
	Feb	1.8	0.4	0	0.3	12.6	0.1	33.1		0.4	0	0	1.8	16.2	6.8	0	2.0	1.8	3.8	Feb.	0.1	1.7	20.7	1.7	15.9	8.0	6.1	185.5		0.8	1.3	17.7	7.1	0.3	0.4	4.0	0.4	2.2	24.2	4.8	0.9	0	0.9	0	0.5	17.4	3.9	0.4	17.6
	Mar	0.3	0.6	0	0.3	12.5	0.1	16.1		0.5	0	0	0.1	16.2	6.8	0	2.3	1.8	3.8	Mar.	0.1	2.3	21.3	1.7	15.5	7.9	6.2	174.3		1.2	1.3	16.0	6.6	0.4	0.4	4.0	0.4	2.2	24.2	4.8	1.0	0	1.0	0	0.5	17.0	3.9	0.4	17.2
	Apr	0	1.0	0	0.3	0	0.1	18.7		0.8	0	0	0.1	0.9	0.3	0.4	3.7	1.8	5.9	Apr.	0.4	3.2	6.8	1.8	5.6	2.6	1.8	145.8		1.9	2.7	3.6	1.6	0.2	0.2	4.0	0.2	2.2	8.6	1.8	0.2	0	0.2	0	0.5	1.0	0.2	0.2	7.3
	May	12.4	2.9	0.9	0	0	0.2	49.3		2.3	0	1.0	0.1	1.2	0.5	0.4	4.1	2.6	23.3	May	1.5	14.5	42.5	0	29.4	6.7	0.6	168.3		0	5.7	4.9	36.0	14.6	0.2	0.2	4.0	0.2	5.5	34.2	7.8	4.2	0	4.2	0	1.2	38.8	8.5	0.8	38.2
	June	26.4	13.2	0.9	0	0	0.2	89.7		3.7	2.3	1.0	0.5	29.7	9.7	0.6	24.9	4.7	25.8	June	2.5	24.0	99.3	0	80.5	4.9	0.7	230.7	a	15.0	4.1	1.4	36.0	14.6	0.3	0.2	4.0	0.2	2.7	34.2	7.8	2.2	2.7	0	4.9	0	2.0	49.6	9.6	0.9	45.2
	July	13.8	4.3	0.9	0	0	0.4	108.5		7.0	1.1	1.0	0.5	9.4	1.9	0.2	17.2	4.8	8.1	July	12.0	26.8	60.9	0	60.0	9.1	1.1	219.4	a	35.0	8.0	1.0	36.0	14.6	2.7	0.3	4.0	0.3	4.3	34.2	7.8	12.8	0	4.0	0	1.3	44.7	9.2	0.8	46.0
	Aug	5.6	2.5	0.9	0	1.5	0.5	115.2		2.8	0	1.0	0.2	1.6	0.7	0.1	7.7	1.8	8.1	Aug	4.6	10.0	26.9	1.1	27.3	6.4	4.3	218.7	a	0	4.1	1.4	27.6	11.2	1.1	0.4	5.4	0.4	1.4	34.5	7.9	3.7	0	3.7	0	0.9	25.8	5.7	0.5	25.5
1927	Sept	2.0	2.2	0.9	0	1.0	0.5	117.0		1.8	0	1.0	0.2	1.6	0.7	0.1	9.5	1.8	7.7		2.6	5.8	20.7	0.7	18.8	4.4	1.1	148.9		1.3	1.4	4.0	1.4	1.2	23.5	5.4	2.5	0	2.5	0	0.7	22.8	5.0	0.5	22.4
Totals		104.4	31.5	4.5	2.1	106.0	2.8	—	0	26.4	5.4	5.0	12.4	111.6	47.0	1.7	77.8	26.9	101.0		60.9	112.1	385.6	14.0	339.2	77.7	7.5	—	0	60.0	52.1	16.6	376.7	160.7	17.0	4.4	48.0	13.3	28.2	592.0	76.8	60.8	2.1	21.8	2.5	16.4	359.0	77.0	7.2	342
1927	Oct	2.4	1.1	0	0.3	12.1	0.3	102.7		0.7	0	0	1.8	16.2	6.8	0.1	4.3	1.8	4.7		0.4	3.8	25.1	1.6	14.7	8.5	6.8	238.1		4.3	1.8	30.8	7.4	0.8	0.5	4.0	0.5	1.1	20.2	4.6	2.7	0	2.7	0	0.6	19.6	4.3	0.4	19.2
	Nov	1.8	1.0	0	0.3	12.2	0.2	87.5		0.6	0	0	1.8	16.2	6.8	0	3.2	1.8	4.8	Nov.	0.3	3.3	28.0	1.6	16.7	8.7	6.6	218.0		1.4	2.0	28.3	7.1	0.6	0.5	4.0	0.5	1.0	18.3	4.3	2.2	0	2.2	0	0.5	18.2	4.2	0.4	17.8
	Dec	1.0	0.6	0	0.3	12.5	0.1	71.2		0.5	0	0	1.8	16.2	6.8	0	2.6	1.8	3.8	Dec.	0.2	2.2	24.6	1.7	17.1	8.8	6.4	194.6		1.3	2.1	30.5	8.1	0.5	0.6	4.0	0.6	1.0	20.8	4.6	1.5	0	1.5	0	0.6	20.3	4.5	0.4	19.9
1928	Jan	0.5	0.4	0	0.3	13.6	0.1	57.8		0.4	0	0	1.8	16.2	6.8	0	2.3	1.8	3.8	Jan.	0.2	1.6	20.8	1.7	15.7	8.7	6.2	187.9		1.0	1.8	26.4	7.7	0.4	0.4	4.0	0.4	1.0	18.5	4.5	1.8	0	1.8	0	0.6	18.6	4.1	0.4	18.2
	Feb	0.7	0.4	0	0.3	12.6	0.1	34.7		0.4	0	0	1.8	16.2	6.8	0	2.1	1.8	3.8	Feb.	0.1	1.5	19.9	1.8	15.8	7.9	6.2	173.7		0.8	1.2	17.4	6.8	0.3	0.3	4.0	0.3	2.3	24.2	4.8	1.0	0	1.0	0	0.5	17.3	3.8	0.4	17.5
	Mar	0.6	0.4	0	0.3	12.0	0.1	24.6		0.5	0	0	1.8	10.3	4.3	0.1	2.4	1.8	3.8		0.1	2.2	15.0	1.8	13.6	6.9	6.2	163.0		1.1	1.3	16.0	6.6	0.4	0.4	4.0	0.4	2.2	24.2	4.8	1.0	0	1.0	0	0.5	17.0	3.8	0.4	16.7
	Apr	0	0.6	0	0.3	0	0.1	24.7		0.5	0	0	0.1	0.7	0.2	0.1	2.4	1.8	4.3	Apr.	0.4	3.2	6.8	1.8	5.4	2.5	1.8	170.0		1.4	2.0	2.9	1.3	0.2	0.1	4.0	0.1	2.2	7.9	1.7	0.2	0	0.2	0	0.5	1.0	0.2	0.2	7.1
	May	23.1	3.2	0.9	0	0	0.2	72.0		2.7	0	1.0	0.2	1.5	0.6	0.5	4.7	2.6	24.9	May	2.1	21.6	47.2	0	26.4	6.7	0.6	201.0		5.0	0.3	4.0	1.9	0.3	0.2	4.0	0.2	5.2	34.2	7.8	11.0	0	11.0	0	1.2	40.0	8.8	0.7	39.3
	June	32.4	13.1	0.9	0	0	0.3	95.3		3.0	1.8	1.0	0.5	47.7	12.0	0.7	24.7	4.7	24.7	June	2.2	22.4	94.6	0	84.7	5.8	0.7	260.0	a	41.1	14.2	1.2	36.0	14.6	4.1	0.3	4.0	0.3	4.7	34.2	7.8	12.2	0.6	4.0	0	2.2	59.6	7.6	0.6	49.7
	July	14.5	5.7	0.9	0	0	0.4	114.2		6.3	0.7	1.0	0.5	4.1	1.7	0.2	14.1	4.8	15.6	July	13.4	24.0	56.1	0	54.9	10.9	1.2	266.0	a	23.7	5.8	1.0	36.0	14.6	2.5	0.3	4.0	0.4	2.4	34.2	7.8	12.6	0	4.0	0	1.3	44.5	9.1	0.8	46.0
	Aug	1.9	2.0	0.9	0	0	0.3	116.7		2.2	0	1.0	0.1	1.1	0.5	0.1	6.1	1.8	7.0	Aug	3.0	8.1	19.2	1.0	18.9	4.3	1.0	256.6	a	0	2.4	1.1	21.7	8.7	1.2	0.3	4.0	0.3	1.1	34.2	7.8	1.9	0	2.4	0	0.6	20.3	4.5	0.4	19.7
1928	Sept	0	1.3	0.9	0	0	0.5	116.6		1.4	0	1.0	0.0	0.1	0	0	3.4	1.8	5.4		1.6	5.0	14.1	1.3	17.9	4.2	1.2	258.5		0	2.4	1.1	24.4	9.7	0.9	0.3	4.0	0.3	1.1	20.6	4.7	2.5	0	2.5	0	0.8	22.0	4.9	0.4	19.6
Totals		78.1	29.0	4.5	2.1	77.0	2.9	—	0	24.3	2.5	5.0	11.6	103.2	43.3	2.2	72.9	26.7	99.1		55.4	123.7	364.4	14.4	306.6	72.5	8.0	—	0	53.8	47.0	16.8	378.6	137.3	17.0	4.7	48.0	14.8	33.5	512.2	74.0	56.0	0.6	20.4	2.5	12.3	344.4	74.8	7.0	337
1928	Oct	1.2	0.5	0	0.3	11.5	0.3	100.2		0.5	0	0	1.8	16.2	6.8	0	2.7	1.8	2.5		0.4	2.0	24.1	1.6	14.2	8.3	6.8	227.6		1.6	1.1	18.9	7.7	0.4	0.3	4.0	0.3	1.0	18.2	4.1	1.5	0	1.5	0	0.5	17.9	3.9	0.4	17.5
	Nov	0.9	0.6	0	0.3	11.5	0.2	88.7		0.4	0	0	1.8	16.2	6.8	0	2.0	1.8	2.5	Nov.	0.3	2.5	22.4	1.6	14.3	8.3	6.5	221.6		1.4	1.6	18.2	7.4	0.4	0.4	4.0	0.4	1.0	18.3	4.1	1.4	0	1.4	0	0.5	17.7	3.9	0.4	17.4
	Dec	0.6	0.5	0	0.3	11.6	0.1	66.9		0.4	0	0	1.8	16.2	6.8	0	2.5	1.8	2.5	Dec.	0.2	1.9	20.5	1.7	14.7	8.1	6.3	205.8		1.2	1.8	17.5	7.0	0.4	0.4	4.0	0.4	1.0	18.3	4.1	1.3	0	1.3	0	0.5	17.6	3.8	0.4	17.3
1929	Jan	0.4	0.5	0	0.3	12.6	0.1	52.7		0.4	0	0	1.8	16.2	6.8	0	2.0	1.8	2.5	Jan.	0.2	1.9	20.7	1.7	14.7	8.0	6.3	204.8		1.1	1.7	17.3	6.9	0.4	0.4	4.0	0.4	1.0	18.3	4.1	1.2	0	1.2	0	0.5	17.4	3.8	0.4	17.1
	Feb	0.4	0.4	0	0.3	12.6	0.1	32.2		0.4	0	0	1.8	16.2	6.8	0	2.0	1.8	2.5	Feb.	0.1	1.5	19.8	1.7	14.8	7.9	6.3	184.6		0.8	1.2	16.9	6.7	0.3	0.3	4.0	0.3	2.3	24.2	4.8	0.8	0	0.8	0	0.5	17.2	3.8	0.4	16.9
	Mar	0.4	0.5	0	0.3	0	0.1	66.7		0.5	0	0	0.1	0.7	0.2	0.1	2.4	1.8	4.3		0.1	2.2	15.0	1.8	13.6	6.9	6.2	163.0		1.1	1.3	16.0	6.6	0.4	0.4	4.0	0.4	2.2	24.2	4.8	1.0	0	1.0	0	0.5	17.0	3.8	0.4	16.7
	Apr	5.2	1.5	0	0.3	0	0.1	72.0		1.2	0	0	0.1	1.1	0.5	0.4	3.7	1.8	5.6	Apr.	1.4	5.2	12.4	1.8	5.6	2.6	1.8	179.4		1.7	2.7	3.6	1.6	0.2	0.2	4.0	0.2	2.2	8.6	1.8	0.2	0	0.2	0	0.5	1.0	0.2	0.2	7.3
	May	13.8	1.7	0.9	0	9.6	0.2	76.3		1.4	0	1.0	1.0	9.0	2.9	0.6	15.7	4.8	8.3		5.9	9.0	37.8	0	32.9	7.6	0.7	186.5		2.7	0.1	4.0	0.7	2.5	34.2	7.8	5.4	0	5.4	0	1.7	39.5	9.2	0.7	39.1
	June	31.5	9.5	0.9	0	0	0.3	114.4		5.6	0.4	1.0	0.5	3.8	1.6	0.7	22.3	4.7	8.7		20.9	14.8	63.7	0	24.9	4.7	0.3	234.8		9.0	2.3	4.0	1.8	0.3	0.2	4.0	0.2	5.2	34.2	7.8	11.7	0	11.7	0	1.1	36.0	7.9	0.7	35.7
	July	6.7	3.1	0.9	0	7.0	0.4	116.2		3.6	0	1.0	0.3	7.5	3.4	1.2	9.9	4.8	10.1		8.0	18.9	39.7	0.4	20.0	4.7	1.2	252.0		5.1	2.7	25.9	10.5	1.8	0.2	4.0	0.2	5.4	34.8	8.7	7.5	0	4.0	0	0.8	27.6	6.1	0.6	26.4
	Aug	5.1	3.1	0.9	0	6.4	0.5	114.4		3.4	0	1.0	0.3	8.1	3.4	0.7	11.4	4.8	10.1		9.4	12.5	35.7	0.2	25.5	6.0	1.4	260.0		6.8	1.9	24.2	13.9	2.5	0.3	4.0	0.3	7.8	34.2	7.8	5.4	0	4.0	0	1.0	32.2	7.3	0.7	32.0
1929	Sept	0	1.2	0.9	0	0	0.5	116.2		1.0	0	1.0	0	0	0	0	4.7	1.8	7.7		1.2	4.5	10.8	1.1	21.3	5.0	1.2	247.3		0	2.2	1.0	24.0	9.6	0.8	0.3	4.0	0.3	1.1	20.4	4.6	2.3	0	2.3	0	0.7	22.4	5.0	0.5	22.0
Totals		68.4	23.4	4.5	2.1	32.5	3.0	—	0	19.7	0.4	5.0	9.7	97.1	36.7	1.8	10.9	22.9	31.6		42.5	11.7	292.9	11.6	295.9	67.2	8.2	—	0	0	38.4	16.0	340.3	138.0	14.9	4.4	48.0	5.7	18.7	321.3	74.1	43.8	0	22.4	2.5	10.1	335.6	73.8	7.0	323

1/ 15 c.f.s. or natural flow.
2/ 0 c.f.s. or natural flow.
3/ Active capacity 117,000 ac.-ft.
4/ 100 c.f.s. diversion canal to Elbert Canal.
5/ 18 c.f.s. irrigation decree.
6/ Pressure Pass, Hortz, Hring and Columbine Ditches.
7/ 30 c.f.s. or natural flow plus interception loss.
8/ Cols. 5 / 6 / 10 / 13 / 14 / 15 / 19 / 20 - 21.
9/ Cols. 18 / 22 / 24 / 25.
10/ 68 c.f.s. summit at Granite
Cols. 21 / 27 / 28 = 4.0 each month.
11/ 380,000 ac.-ft. active capacity.
12/ Cols. 31 / 37 / 38 / 40 - 41.
13/ Cols. 36 / 42 - 43.
14/ 575 c.f.s. diversion canal.
15/ 67 c.f.s. irrigation decree or natural flow.
16/ 0 c.f.s. during winter - included in Col. 46 during irrigation season.
17/ Col. 46 / 47 - 48 - 49 - 50 - 51.
Col. 52 - 56.
18/ Col. 41 / 50.
Cols. 53 / 43 / 51 / 56.
19/ Includes

Con't.

ND LANT			JOHNSON POWERPLANT							SALIDA POWERPLANT				SALIDA GAGE									PUEBLO RESERVOIR OPERATION																				
l 85 or-ion e	Total flow to Princeton Power Plant	Power generated at Princeton Power Plant		Chalk Creek 68.6 sq. mi.	Chalk Creek spills	Irrigation by-pass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 25 & interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant		Canal loss 25	Total flow thru Salida Power Plant	Power generated at Salida Power Plant		Cottonwood Creek 71.0 sq. mi.	680.8 sq. mi. uncontrolled area	Accumulated fish flows	Return of Chalk Creek spills (Col. 48)	Return of Chalk Creek irr. by-pass (Col. 49)	Canal loss returned plus spills below Granite Power Plant		Project operation flow to Salida Gage	Historical recorded flow to Salida Gage		Transportation loss 12%	Gain between Salida and Pueblo	Historical diver. of Rosemont Ditch	Project operation flow to Pueblo Reservoir	Historical recorded flow to Pueblo Res.	Historical recorded flow reproduced below Pueblo Res.	Winter storage Arkansas R. water released	Project supplemental irr. water released	Independence Pass water released	Total release thru Pueblo Power Plant	Historical Rosemont Ditch Diver. released	Valley Canal spill water release	Power generated at Pueblo Power Plant	Reservoir evaporation	Reservoir content end of month	Project water spills	Winter Arkansas River water spills		Total power generated at all Power Plants			Pre-Project Headgate shortage
	(44) 13/	(45)		(46)	(47)	(48) 14/	(49) 15/	(50) 16/	(51)	(52) 17/		(54)	(55) 18/	(57)		(58)	(59)	(60) 19/	(61) 19/	(62)	(63) 20/		(64) 21/	(65)		(66)	(69)	(70)	(71)	(72)	(73) 22/	(74) 23/	(75)	(76)	(77)	(78) 24/	(79) 24/	(80)	(81)	(82)	(83)	(84)	(85)		(86)	(87)	(88)	(89)
	20.0	4.6		2.2	0	2.2	0	0.6	18.4	4.3		0.4	19.0	6.5		2.1	4.3	4.0	0	2.2	2.0		33.6	23.4		-1.1	+5.5	3.1	38.0	28.9	25.8	0	0	3.0	28.8	3.1	1.1	0	0.1	9.6					39.1			0
	18.9	4.3		2.0	0	0	0.5	0.6	19.8	4.4		0.4	19.4	6.4		2.0	5.2	4.5	0	0	2.0		33.1	23.3		-1.7	+6.9	4.2	38.3	24.7	5.0	0	0	0	5.0	0	0.9	0	0.1	41.9					33.6			0
	20.0	4.6		1.2	0	0	0.5	0.6	20.1	4.4		0.4	19.7	6.5		1.6	5.3	4.5	0	0	2.1		33.2	14.4		-2.1	+9.9	1.6	41.0	24.3	4.9	0	0	0	4.9	0	1.0	0	0.2	76.8					34.8			0
	18.2	4.1		1.0	0	0	0.5	0.6	18.1	4.0		0.4	17.7	5.9		1.4	4.2	4.5	0	0	2.0		29.8	12.9		-1.9	+10.4	2.5	38.3	23.3	5.1	0	0	0	5.1	0	1.0	0.4	0.2	108.8					32.7			0
	34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.2	3.5	4.5	0	0	3.8		45.9	11.5		-3.8	+7.0	2.4	49.1	18.5	4.3	0	0	0	4.3	0	0.9	0.5	0.3	151.9					45.9			0
	34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.2	3.5	4.5	0	0	3.8		45.7	13.4		-3.6	+7.6	4.3	48.7	21.0	6.0	0	0	0	6.0	0	1.1	0.5	0.4	145.1					49.2			0
	34.2	7.8		1.2	0	1.2	0	1.0	33.2	7.3		0.7	32.5	10.8		1.2	2.3	4.5	0	1.2	3.7		45.0	24.7		-2.7	+20.7	7.3	63.0	41.4	33.6	0.9	0	180	44.4	7.9	1.2	5.2	0.9	203.9	0	0			53.9			0.9
	34.2	7.8		3.0	0	4.0	0	1.1	37.1	8.2		0.7	36.4	12.1		1.4	3.2	4.0	0	4.0	6.2		58.3	34.0		0	+25.3	8.4	83.6	84.7	75.5	48.5	0	180	134.5	8.4	1.4	7.9	1.3	141.8					58.2			49.6
	34.2	7.8		18.1	0.7	4.0	0	1.0	33.6	7.6		0.9	32.7	10.9		1.3	3.5	4.0	0	4.0	11.8		76.9	102.0		+2.3	+38.4	14.6	114.3	136.6	122.0	26.9	21.3	12.0	182.2	14.6	1.6	7.9	1.4	55.9					60.9			62.9
	34.2	7.9		10.9		4.0	0	1.2	39.9	8.8		0.8	39.1	13.0		4.2	2.6	4.0	0	4.0	17.2		73.1	49.8		+1.8	+12.4	10.6	99.5	102.4	91.8	0	8.0	11.0	110.5	10.6	1.8	7.9	0.9	19.3					62.1			74.9
	34.5	7.9		3.5	0	3.5	0	0.9	30.6	6.7		0.6	30.0	10.0		2.9	4.1	4.0	0	3.5	5.2		48.7	45.2		+1.9	+2.4	8.2	52.0	67.4	59.4	0	0	0	59.4	8.2	1.6	0	0.5	1.6					44.6			49.1
	23.6	5.4		2.3	0	2.3	0	0.7	22.9	5.0		0.5	22.4	7.4		1.9	3.0	4.0	0	2.3	2.4		36.0	20.4		-1.7	+0.9	3.5	35.2	21.3	17.8	0	0	0	17.8	3.5	1.4	0	0.1	14.0					38.7			24.9
5	337.4	77.0		52.2	0.7	21.2	2.5	13.3	35.9	77.5		7.2	344.7	114.4		37.9	43.1	50.5	0.7	21.2	60.2		557.3	447.9		-12.1	+143.8	71.7	690.0	593.7	450.4	77.3	29.3	46.0	603.0	56.3	15.0	30.3	6.4	—	0	0			557.6	17		337.6
	19.6	4.5		1.5	0	1.5	0	0.6	19.0	4.2		0.4	18.6	6.2		1.4	3.3	4.0	0	1.5	2.0		30.8	17.1		-1.5	+2.6	3.4	31.9	19.7	16.3	0	2.7	0	18.4	2.4	1.1	0	0.3	22.7					24.0			2.4
	18.9	4.3		1.7	0	0	0.5	0.6	19.5	4.3		0.4	19.1	6.3		1.6	4.3	4.5	0	0	2.0		31.5	17.3		-1.6	+9.8	2.3	39.7	27.1	32	0	0	0	32	0	0.9	0	0.2	58.1					33.6			0
	19.8	4.5		1.2	0	0	0.5	0.6	18.9	4.4		0.4	19.5	6.5		1.6	4.1	4.5	0	0	2.0		32.4	15.7		-1.8	+9.3	3.4	39.9	25.0	3.6	0	0	0	3.6	0	1.0	0.3	0.2	78.2					34.9			0
	18.4	4.2		1.1	0	0	0.5	0.6	18.4	4.0		0.4	18.0	6.0		1.5	4.8	4.5	4	2	2.0		30.8	16.6		-1.8	+11.0	2.8	40.0	25.6	3.5	0	0	0	3.5	0	1.0	0.3	0.3	128.4					32.8			0
	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.2	3.5	4.5	0	0	3.9		46.5	15.2		-3.4	+13.8	4.5	55.9	28.0	3.5	0	0	0	3.5	0	1.1	0.4	0.4	223.4					55.9			0
	34.2	7.8		1.1	0	1.1	0	1.0	33.1	7.3		0.7	32.5	10.8		1.2	2.7	4.0	0	1.1	3.7		44.6	17.4		-3.0	+4.1	4.2	45.7	21.5	17.3	20.1	0	9.0	46.4	4.2	1.2	5.7	1.0	2.463					24.0			20.1
	34.2	7.8		9.8	0	4.0	0	1.2	38.8	8.5		0.8	38.0	12.6		4.0	7.0	4.0	0	4.0	7.5		62.0	29.3		-1.8	- 3.9	5.9	57.3	76.4	69.5	46.5	1.7	12.0	143.7	5.9	1.4	7.9	1.4	10.2					47.8			23.3
	34.2	7.8		22.5	2.1	4.8	0	2.0	49.4	9.6		0.9	48.7	14.2		4.3	7.9	4.0	2.1	4.0	33.8		108.3	132.0		+2.4	+14.4	15.6	136.1	145.4	123.8	0	7.0	17.0	165.8	15.6	1.6	7.9	1.1	48.2					46.7			31.3
	34.2	7.8		12.8	0	4.0	0	1.3	44.7	9.2		0.8	44.0	13.6		3.9	7.3	6.0	0	4.0	33.9		92.9	95.9		-6.3	+17.9	11.6	116.5	113.9	102.2	0	28.1	150	145.3	11.6	1.4	0	0.8	0.2					43.2			46.4
	24.6	6.1		3.7	0	3.7	0	0.8	25.8	5.7		0.5	25.3	7.8		3.1	4.2	4.0	0	3.7	2.7		43.0	39.0		-0.9	+30.5	4.3	73.1	62.5	65.2	0	0.8	0	66.0	4.3	1.4	0	0	1.4					73.2			55.7
2	28.5	5.4		3.5	0	3.5	0	0.7	22.8	5.0		0.5	22.3	7.4		2.9	4.0	4.0	0	3.5	2.4		39.1	35.2		-0.4	+ 7.7	4.3	45.9	42.4	38.1	0	0	0	38.1	4.3	1.4	0	0.1	2.4					32.8			0
2	392.0	75.8		60.8	2.1	21.8	2.5	16.4	350.0	77.0		7.2	342.8	113.7		43.0	44.3	50.5	2.1	21.8	111.8		646.3	491.2		-13.3	+12.7	64.3	720.7	611.9	455.6	100.6	51.7	53.0	660.9	49.3	15.0	22.8	6.1	—	0	0			558.9	0		293.7
	20.2	4.6		2.7	0	2.7	0	0.6	19.6	4.3		0.4	19.2	6.4		2.6	5.2	4.0	0	2.7	2.1		35.8	28.5		-0.8	+15.8	2.9	50.8	44.3	41.4	0	0	0	44.4	2.9	1.1	0	0.1	8.7					34.0			0
	18.8	4.3		2.2	0	0	0.5	0.6	19.9	4.4		0.4	19.5	6.5		2.2	5.7	4.5	0	0	2.0		33.9	29.3		-1.2	+ 9.6	0	48.3	32.9	1.2	0	0	0	1.2	0	0.9	0	0.1	48.8					33.5			0
	20.0	4.6		1.4	0	0	0.5	0.6	20.3	4.5		0.4	19.9	6.6		1.8	4.2	4.5	0	0	2.1		34.5	19.4		-1.7	+ 9.4	2.2	42.2	28.8	1.4	0	0	0	1.4	0	1.0	0.1	0.2	78.4					34.9			0
	18.5	4.2		1.2	0	0	0.5	0.6	18.6	4.1		0.4	18.2	6.0		1.6	3.7	4.5	0	0	2.0		32.8	17.2		-1.6	+11.3	1.7	41.9	28.5	1.5	0	0	0	1.5	0	1.0	0.1	0.3	127.5					32.6			0
	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.4	4.7	4.5	0	0	3.9		46.4	14.8		-3.6	+ 7.1	4.0	52.2	21.9	4.3	0	0	0	4.3	0	0.9	0.1	0.3	176.2					45.5			0
	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.4	2.4	4.5	0	0	3.9		46.4	15.8		-3.4	+ 7.8	4.6	50.8	23.4	1.4	0	0	0	1.4	0	1.1	0.2	0.4	226.1					33.2			0
	34.2	7.8		0.8	0	1.2	0	1.0	33.2	7.3		0.7	32.5	10.8		0.9	1.7	4.0	0	1.2	3.6		49.5	17.9		-2.8	+ 3.1	5.0	63.8	21.0	16.0	24	0	7.0	52.4	5.0	1.2	4.0	1.0	228.3					42.7			24
	34.2	7.8		11.0	0	4.0	0	1.2	46.0	9.4		0.9	45.2	13.0		4.0	2.7	4.0	0	4.0	7.9		67.8	48.2		0	+27.9	12.2	75.7	94.1	83.9	46.8	0	1.0	141.7	12.2	1.4	7.9	1.5	207.3					57.4			46.8
	34.2	7.8		12.7	0.6	4.0	0	1.2	47.6	9.7		0.7	46.9	14.2		5.1	5.5	6.0	0.6	4.0	14.3		78.7	102.0		+2.6	+30.2	15.4	111.5	132.2	59.1	62.8	0	4.0	112.9	15.4	1.6	7.9	1.8	18.7					61.3	52.7		62.8
	34.2	7.8		12.6	0	4.0	0	1.3	44.5	9.1		0.8	44.7	13.5		3.4	2.7	4.0	0	4.0	34.2		92.7	94.1		+0.2	+11.3	10.5	104.2	106.4	94.9	12.2	0	5.0	112.1	10.5	1.8	7.9	1.9	165.0					42.5			12.2
	20.9	4.8		2.4	0	2.4	0	0.6	20.3	4.5		0.4	19.9	6.4		2.0	3.2	4.0	0	2.4	2.1		33.6	40.8		+ 3.0	+ 11.5	6.8	48.1	72.3	45.5	21.6	0	2.0	89.1	6.8	1.6	7.9	2.0	113.6					57.8			24.6
	20.6	4.7		2.5	0	2.5	0	0.6	20.0	4.4		0.4	19.6	6.5		2.1	3.1	4.0	0	2.5	2.1		33.9	24.6		-0.7	+ 6.9	4.6	53.6	33.5	28.9	0	0	1.0	29.9	4.6	1.4	4.3	1.4	95.9					32.8			4.3
2	324.2	74.0		56.0	0.6	20.4	2.5	12.3	344.4	76.8		7.0	337.4	112.1		40.9	48.1	50.5	0.6	20.4	82.3		530.2	488.6		-10.0	+151.9	69.9	722.1	640.5	396.5	102.8	0	27.0	536.3	57.4	15.0	40.4	10.9	—	0	30.0			535.4	57.7		103.1
	18.2	4.1		1.5	0	1.5	0	0.5	17.7	3.9		0.4	17.3	5.7		1.4	3.3	4.0	0	1.5	1.9		29.4	18.8		-1.2	+4.4	2.5	32.6	23.2	20.4	0	0	0	20.4	2.8	1.1	1.9	0.9	10.8					23.9			0
	18.2	4.1		1.6	0	0	0.5	0.6	18.7	4.1		0.4	18.3	6.1		1.6	4.3	4.5	0	0	2.0		30.7	14.6		-1.6	+10.5	1.6	39.6	27.1	9.7	0	0	0	9.7	0	0.9	0.9	0.2	138.4					24.2			0
	18.3	4.1		1.0	0	0	0.5	0.6	19.2	4.2		0.4	18.8	6.2		1.4	4.4	4.5	0	0	2.0		31.3	18.3		-1.9	+14.1	3.0	43.5	28.4	9.8	0	0	0	9.8	0	1.0	1.0	0.4	16.8					24.2			0
	17.8	4.1		1.0	0	0	0.5	0.5	17.8	3.9		0.4	17.4	5.8		1.3	3.9	4.5	0	0	1.8		28.9	13.9		-1.7	+12.7	2.0	37.9	24.0	9.8	0	0	0	9.8	0	1.0	1.1	0.4	192.6					32.9			0
2	28.9	5.8		1.8	0	0	0.5	0.7	22.5	5.0		0.4	22.1	7.8		1.1	3.1	4.5	0	0	2.5		33.3	11.0		-2.5	+13.9	2.2	44.7	24.9	9.7	0	0	0	9.7	0	0.9	1.2	0.4	426.3					24.4			0
2	34.2	7.8		1.0	0	0	0.5	1.0	33.7	7.4		0.7	33.0	11.0		1.4	4.2	4.5	0	0	3.9		47.0	14.9		-3.5	+10.5	4.4	54.0	25.4	9.8	0	0	0	9.8	0	1.1	1.2	0.5	226.9					46.3			0
	18.7	4.3		0.8	0	0.8	0	0.6	18.1	4.0		0.4	17.7	5.9		1.3	1.6	4.0	0	0.8	2.0		27.0	23.8		-0.4	- 1.0	5.3	25.6	22.8	17.5	28.1	0	5.0	42.6	5.9	1.2	5.5	1.1	244.9					32.0			28.1
	34.2	7.8		2.2	0	4.0	0	1.2	37.2	8.2		0.7	36.5	12.1		3.9	2.1	4.0	0	4.0	5.1		57.6	41.2		+1.6	+ 1.6	6.2	60.4	47.8	42.6	2.9	52.0	2.9	10.0	128.5	6.2	1.4	7.9	1.5	167.1					58.1			45.1
	34.2	7.8		19.5	1.1	4.0	0	5.0	43.6	9.6		0.9	42.7	14.2		4.1	3.6	4.0	1.1	4.0	28.1		104.6	133.0		+0.9	+ 2.3	13.1	117.9	125.2	112.1	0	16.2	16.0	144.3	13.1	1.6	7.9	1.6	124.2					63.0			28.9
	34.2	7.8		11.4	0	4.0	0	1.2	40.4	8.9		0.8	39.6	13.1		6.5	2.7	4.0	0	4.0	24.5		81.3	76.4		-0.8	+ 27.5	8.7	108.0	101.9	98.2	0	35.1	80.0	214.3	8.7	1.3	7.9	1.5	71.9					64.7			49.8
	34.2	7.8		9.2	4	4.0	0	1.2	38.2	8.4		0.8	37.4	12.4		2.7	3.9	4.0	0	4.0	14.3		76.3	42.7		-1.5	+105.8	11.7	180.6	108.5	104.1	0	17.0	7.0	180.8	11.7	1.6	7.9	1.7	57.2					57.0			23.1
	32.7	7.5		6.9	0	4.0	0	1.1	34.5	7.6		0.7	33.8	11.2		5.8	7.0	4.0	0	4.0	9.5		58.1	46.0		-1.1	+ 47.6	9.3	104.6	95.6	86.3	0	0	0	86.3	9.3	1.4	6.8	0.9	62.9					53.3			0
4	318.8	72.7		62.9	11	22.3	2.5	14.2	344.6	75.2		7.0	337.6	111.0		46.1	49.5	50.5	11	22.3	111.4		615.6	479.0		-14.1	+249.8	70.3	851.2	738.3	598.7	72.1	71.2	53.0	800.0	57.1	15.0	51.2	11.1	—	0	0			566.8	0		176.9
	20.9	4.8		3.1	0	3.1	0	0.6	20.2	4.5		0.4	19.8	6.4		2.9	5.6	4.0	0	3.1	2.1		37.6	33.0		-0.5	+15.5	4.7	52.6	48.5	42.8	0	0	1.0	44.8	4.7	1.1	8.7	0.7	65.2					33.8			0
	22.1	5.0		2.4	0	0	0.5	0.7	23.3	5.1		0.5	22.8	7.6		2.1	4.1	4.5	0	0	2.4		33.1	21.8		-1.3	+22.7	1.3	57.0	44.5	12.5	0	0	0	12.5	0	0.9	1.0	0.5	110.3					33.5			0
	19.8	4.4		1.3	0	0	0.5	0.6	19.4	4.3		0.4	19.0	6.3		1.6	4.0	4.5	0	0	2.0		33.3	18.1		-1.7	+15.6	2.0	47.2	33.7	12.6	0	0	0	12.6	0	1.0	1.2	0.3	192.6					34.3			0
	17.8	4.0		1.1	0	0	0.5	0.5	17.6	3.9		0.4	17.2	5.7		1.4	3.5	4.5	0	0	1.8		29.4	14.5		-1.7	+13.7	1.1	41.4	28.0	13.0	0	0	0	13.0	0	1.0	1.4	0.4	170.6					32.7			0
2	34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.3	3.7	4.5	0	0	3.9		46.3	13.0		-3.7	+18.0	3.1	60.6	31.0	12.7	0	0	0	12.7	0	0.9	1.4	0.4	217.2					56.9			0
	34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.2	2.9	4.5	0	0	3.8		45.3	12.9		-3.6	+12.5	4.0	58.8	23.4	12.9	0	0	0	12.8	0	1.1	1.5	0.5	255.0					50.4			0
	34.2	7.8		1.0	0	1.0	0	1.0	33.2	7.3		0.7	32.5	10.8		1.7	2.0	4.0	0	1.0	3.7		44.3	33.5		-1.9	+ 1.4	5.8	44.3	34.9	29.1	6.9	0	3.0	37.0	5.8	1.2	5.0	1.0	252.5					33.9			6.9
	34.2	7.8		5.4	0	4.0	0	1.1	39.5	7.2		0.9	38.6	11.8		3.9	1.3	4.0	0	4.0	4.3		57.3	52.1		+ 0.1	- 1.7	4.4	49.7	60.4	45.1	54.8	0	14.0	114.6	4.4	1.4	7.9	1.5	184.1					40.8			54.9
	29.4	6.7		11.7	0	4.0	0	1.1	36.0	7.9		0.7	35.3	11.7		6.4	2.7	6.0	0	4.0	2.3		58.9	94.6		+4.3	+ 9.9	8.9	65.1	99.5	90.6	24.2	41	12.0	130.9	8.9	1.6	7.9	1.6	102.2					62.6			29.9
	24.8	5.7		7.5	0	4.0	0	0.8	27.6	6.1		0.6	26.9	8.9		4.3	2.2	4.0	4	4.0	2.7		44.1	40.9		+ 1.8	+14.0	9.1	59.9	74.9	65.8	0	24.4	18.0	118.2	9.1	1.3	7.9	1.3	31.7					47.4			42.2
	33.0	7.5		5.2	0	4.0	0	1.0	32.2	7.3		0.7	31.5	10.8		4.4	5.6	4.0	0	4.0	3.4		53.9	53.9		0	+ 27.7	9.6	103.6	103.6	94.0	0	23.1	5.0	122.1	9.6	1.6	0	0.7	1.3					58.9			23.2
	23.6	5.4		2.3	0	2.3	0	0.7	22.9	5.0		0.5	22.4	7.4		1.9	3.0	4.0	0	2.3	2.4		36.0	23.7		-1.4	+14.9	3.6	49.5	34.6	35.0	0	2.4	0	32.4	3.6	1.4	0	0.1	2.3					38.7			8.2
7	327.9	74.7		43.8	0	22.4	2.5	10.1	335.1	73.8		7.0	328.1	109.3		53.1	46.4	50.5	0	22.4	35.8		575.5	431.8		-9.4	+179.2	57.8	685.3	611.0	467.7	85.9	64.0	53.0	670.6	46.3	15.0	38.9	9.0	—	0	0			538.1	0		176.9

17/ Col. 44 / 47 - 48 - 49 - 50 - 51.
18/ Col. 52 - 56.
19/ Col. 61 / 60.
20/ Cols. 58 / 43 / 61 / 56.
21/ Includes any spills in Col. 58.
22/ Winter releases include Pueblo municipal water and other measurable winter flows.
23/ Winter storage less Pueblo Reservoir evaporation for preceding year.
24/ Does not go through Power Plant.

NOTE:
Water in thousands of acre-feet.
Power in millions of kilowatthours.

DEC. 1949

| Water year | Month | SUGAR LOAF RESERVOIR: Inflow from Fryingpan Diver. | Lake Fork at Arkansas River | Irrigation release for Lake Fork lands 1/ | Fish release for Lake Fork 2/ | Release to Elbert Canal | Reservoir evaporation | Reservoir content end of month | Reservoir spills 3/ (10) | ELBERT POWERPLANT (11): Malheson Creek 24.9 sq. mi. (12) | Malheson Creek spills (13) | Irrigation by-pass Malheson Creek land 4/ (14) | Elbert Canal loss 10% 5/ (15) | Total flow thru Elbert Power Canal (16) | Power generated Elbert Power Plant (17) | SNOWDEN DIVERSON (18): Inflow from small existing transmtn. diver. 6/ (19) | 192.5 sq. mi. Arkansas R. drainage available at Snowden Diver. (20) | Fish flow passed at Snowden Diver. 7/ (21) | Total available at Snowden Diver. (22) | TWIN LAKES RESERVOIR (23): Twin Lakes (Independence Phase) Diver. (24) | Lake Creek 106.0 sq. mi. (25) | Total Inflow to Twin Lakes (26) | Fish flow released for demand at Granite 10/ (27) | Release to Granite Power Plant (28) | Power generated at Granite Power Plant (29) | Reservoir evaporation (30) | Reservoir content end of month 11/ (31) | Reservoir spills (32) | WAPACO POWERPLANT (33): Spills below Granite Power Plant (34) | Clear Creek 67.7 sq. mi. (35) | 37.6 sq. mi. above Clear Creek Canal (36) | Total flow thru Wapaco Power Plant (36) | Power generated at Wapaco Power Plant (37) | WAPACO INTERCEPTION AND PRINCETON POWERPLANT (38): 79.9 sq. mi. above Granite Gage (39) | 25.5 sq. mi. above Wapaco intercept. Diver. (40) | Fish flow at Wapaco by-pass 8/ (41) | Wapaco interception to Princeton Plant (42) | Canal loss 5% & interception loss (43) | Total flow to Princeton Power Plant (44) | Power generated at Princeton Power Plant (45) | JOHNSON POWERPLANT (46): Chalk Creek 88.6 sq. mi. (47) | Chalk Creek spills (48) | Irrigation by-pass for Chalk Creek land (49) | Fish flow by-pass Chalk Creek (50) | Canal loss 8% & interception loss (51) | Total flow thru Johnson Power Plant (52) | Power generated at Johnson Power Plant (53) | SA (54) |
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ANT		JOHNSON POWERPLANT							SALIDA POWERPLANT				SALIDA GAGE										PUEBLO RESERVOIR OPERATION																							
Total flow to Princeton Power Plant	Power generated at Princeton Power Plant		Chalk Creek 88.8 sq. mi.	Chalk Creek spills	Irrigation bypass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 3% & interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant		Canal loss 2%	Total flow thru Salida Power Plant	Power generated at Salida Power Plant		Cottonwood Creek 71.0 sq. mi.	459.8 sq. mi. uncontrolled area	Accumulated fish flows	Return of Chalk Creek spills (Col. 48)	Return of Chalk Creek irr. by-pass (Col. 49)	Canal loss returns plus spills below Granite Power Plant		Project operation flow to Salida Gage	Historical recorded flow to Salida Gage		Transportation loss 11%	Gain between Salida and Pueblo	Historical diver. of Bessemer Ditch	Project operation flow to Pueblo Reservoir	Historical recorded to Pueblo Res.	Historical recorded flow reproduced below Pueblo Res.	Winter storage Arkansas R. water released	Project supplemental irr. water released	Independence Pass water released	Total release thru Pueblo Power Plant	Historical Bessemer Ditch Diver. released	Valley municipal water release	Power generated at Pueblo Power Plant	Reservoir evaporation	Reservoir content end of month	Project water spills	Winter Arkansas River water spills		Total power generated at all Power Plants	Flood flows stored		Pre-Project Headgate shortage
(44) 15/	(45)	(46)	(47)	(48) 14/	(49) 15/	(50) 16/	(51)	(52) 17/	(53)	(54)	(55)	(56) 18/	(57)	(58)	(59)	(60)	(61) 19/	(62)	(63)	(64) 20/	(65)	(66) 21/	(67)	(68)	(69)	(70)	(71)	(72)	(73) 22/	(74) 23/	(75)	(76)	(77)	(78) 24/	(79) 24/	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)
21.8	5.0		1.9	0	1.9	0	0.7	21.1	4.6		0.4	20.7	6.9		1.8	3.9	40	0	1.9	2.3		34.6	19.5		-1.7	+6.0	4.3	38.9	25.5	21.7	0	0	0	21.2	4.3	1.1	0	0.2	20.4				34.2			0
20.8	4.7		1.9		1.5	0.7	21.5	4.7		0.4	21.1	7.0		1.8	4.9	45		0	2.2		34.5	16.4		-2.0	+10.5	0.2	43.0	26.9	3.8	0	0	0	3.8	0	0.9	0	0.2	58.5				33.4			0
21.8	5.0		1.0		0	0.5	0.7	21.6	4.8		0.4	21.2	7.0		1.3	5.0	45		0	2.3		34.3	13.6		-2.3	+11.2	1.2	43.2	24.8	3.9	0	0	0	3.9	0	1.0	0.3	0.2	96.6				34.7			0
22.9	5.2		0.9		0	0.5	0.7	22.6	5.0		0.5	22.1	7.3		1.2	3.9	45		0	2.4		34.1	11.5		-2.5	+9.9	1.2	41.5	21.4	4.0	0	0	0	4.0	0	1.0	0.4	0.3	132.8				32.8			0
19.6	4.5		2.7		0	0.5	0.6	19.2	4.2		0.4	18.8	6.2		1.0	3.2	45		0	2.0		29.5	11.3		-2.0	+7.3	4.6	34.8	18.6	3.9	0	0	0	3.9	0	0.9	0.4	0.3	162.5				27.9			0
21.0	4.8		0.9		0	0.5	0.6	20.8	4.6		0.4	20.4	6.8		1.2	3.9	45		0	2.1		32.1	12.8		-2.1	+10.1	4.4	40.1	22.9	4.0	0	0	0	4.0	0	1.1	0.4	0.4	197.1				30.0			0
17.7	4.0		0.9		0.9	0	0.5	17.2	3.8		0.3	16.9	5.6		1.0	1.7	40		0.9	1.9		26.2	15.4		-1.2	+10.2	5.8	35.2	25.6	19.8	29.2	0	10.0	57.0	5.8	1.2	6.9	0.9	166.4				31.8			27.2
18.1	4.1		2.2		2.2	0	0.5	17.6	3.9		0.4	17.2	5.7		1.6	0.6	40		2.2	1.9		27.5	34.0		+0.7	+23.9	7.4	52.1	57.9	50.5	56.8	17.9	11.0	136.2	7.4	1.4	7.9	1.1	71.4				33.4			36.4
15.7	4.0		4.0		4.0	0	0.5	15.2	3.8		0.3	14.9	5.6		2.3	1.8	40		4.0	1.7		30.7	50.1		+2.1	+11.1	7.3	43.9	61.7	53.9	0	57.6	0	105.5	7.3	1.6	7.9	6.9	0				34.6			15.7
25.7	5.9		2.6		2.6	0	0.8	24.9	5.5		0.5	24.4	8.1		1.5	1.6	40		2.6	2.7		36.8	27.0		-1.1	+9.2	6.4	38.9	30.2	23.8	0	6.9	0	30.7	6.4	1.8	0	0	0				36.8			23.8
26.3	6.0		1.4		1.4	0	0.8	25.5	5.6		0.5	25.0	8.3		1.2	2.2	40		1.4	2.7		36.5	18.4		-2.0	-0.9	4.2	33.6	17.5	13.3	0	14.5	0	27.8	4.2	1.6	0	0	0				37.2			20.4
23.7	5.4		1.5	0	1.5	0	0.7	23.0	5.1		0.5	22.5	7.5		1.3	2.3	40	0	1.5	2.4		34.0	13.5		-2.3	+1.4	3.1	33.1	14.9	11.8	0	16.8	0	28.6	3.1	1.4	0	0	0				33.4			4.8
257.1	58.6		19.9	0	14.5	2.5	7.8	252.2	55.6		5.0	247.2	82.0		17.2	35.0	50.5	0	14.5	26.4		390.8	243.5		-16.4	+103.9	50.1	478.3	347.4	213.9	86.0	107.7	21.0	428.6	38.5	15.0	24.2	4.5	—	0	0		400.2	0		248.4
19.5	4.4		1.2	0	1.2	0	0.6	18.9	4.2		0.4	18.5	6.1		1.1	2.8	40	0	1.2	2.0		29.6	12.2		-1.9	+5.0	3.3	32.7	17.2	13.9	0	4.3	0	18.2	3.3	1.1	0	0	10.1				34.0			7.1
18.9	4.3		1.3	0	0	0.5	0.6	19.1	4.2		0.4	18.7	6.2		1.3	3.3	45	0	0	2.0		29.8	12.1		-1.9	+6.9	2.0	34.8	19.0	1.3	0	0	0	1.3	0	1.9	0	0.1	48.6				33.6			0
19.8	4.5		1.0	0	0	0.5	0.6	19.7	4.3		0.4	19.3	6.4		1.3	4.4	45	0	0	2.0		31.5	13.5		-2.0	+8.1	2.2	37.6	21.6	1.4	0	0	0	1.4	0	1.0	0	0.2	77.6				34.5			0
34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.2	3.5	45	0	0	3.8		45.9	11.5		-3.8	+7.8	2.3	49.9	19.3	1.3	0	0	0	1.3	0	1.0	0.1	0.2	125.0				56.6			0
34.2	7.8		0.9	0	0	0.5	1.0	33.5	7.4		0.7	32.8	10.9		1.0	3.2	45	0	0	3.8		45.3	10.9		-3.8	+6.6	3.3	48.1	17.5	1.3	0	0	0	1.3	0	1.1	0.1	0.3	170.6				55.6			0
34.2	7.8		0.8	0	0	0.5	1.0	33.5	7.4		0.7	32.8	10.9		1.0	2.8	45	0	0	3.8		44.9	11.0		-3.7	+6.5	3.7	47.7	17.5	1.4	0	0	0	1.4	0	1.1	0.1	0.4	215.4				42.0			0
34.2	7.8		1.6	0	1.6	0	1.0	33.2	7.3		0.7	32.5	10.8		0.7	1.4	40	0	0.6	3.6		42.8	12.4		-3.3	+3.8	4.2	47.3	16.2	12.0	35.7	0	9.0	56.7	4.2	1.2	6.8	0.9	195.7				55.6			25.7
34.2	7.8		4.9	0	4.0	0	1.1	35.9	7.9		0.7	35.2	11.7		4.9	1.6	40	0	4.0	6.0		55.5	55.5		0	+9.6	4.6	65.3	45.1	40.5	48.0	31.7	23.0	162.2	4.6	1.4	7.9	1.3	91.5				57.7			10.3
34.2	7.8		14.6	0	4.0	0	1.3	43.5	7.6		0.9	42.6	14.1		7.3	3.0	40	0	4.0	6.5		68.4	102.0		+3.7	+12.2	4.3	86.3	114.2	109.9	0	17.9	18.0	145.8	4.3	1.6	7.9	1.0	23.1				64.3			76.1
34.2	7.8		12.4	0	4.0	0	1.3	44.3	7.1		0.8	40.5	+3.4		7.1	2.8	40	0	4.0	4.2		62.6	84.8		+2.4	+16.1	9.1	87.1	100.9	91.8	0	0	0	91.8	9.1	1.8	0	0.5	1.0				54.7			133.9
25.8	5.9		4.1	0	4.0	0	0.8	25.1	5.5		0.5	24.6	8.2		3.4	4.6	40	0	4.0	2.7		43.3	41.6		-0.2	+12.7	5.7	55.8	54.3	48.6	0	0	0	48.6	5.7	1.6	0	0.1	0.8				57.3			107.4
23.6	5.4		2.1	0	2.1	0	0.7	22.9	5.0		0.5	22.4	7.4		1.8	2.8	40	0	2.1	2.4		35.5	19.0		-1.8	+5.2	4.2	39.9	24.2	20.0	0	0	0	20.0	4.2	1.4	0	0.1	14.0				32.8			20.4
347.0	79.1		46.6	0	17.9	2.5	11.0	360.2	79.3		7.4	352.8	117.0		33.1	36.2	50.5	0	17.9	42.8		535.3	386.5		-16.3	+100.5	48.9	619.5	487.0	363.4	83.7	53.9	49.0	550.0	35.4	15.0	22.9	5.1	—	0	0		561.7	0		480.9
19.7	4.5		1.8	0	1.8	0	0.6	19.1	4.2		0.4	18.7	6.2		1.7	3.7	40	0	1.8	2.0		31.9	17.0		-1.6	+3.8	3.5	34.1	20.8	17.3	0	2.5	0	19.8	3.5	1.1	0	0.3	23.4				33.5			4.2
18.8	4.3		1.7	0	0	0.5	0.6	19.4	4.3		0.4	19.0	6.3		1.6	4.4	45	0	0	2.0		31.5	15.8		-1.7	+5.9	2.9	35.7	21.7	1.2	0	0	0	1.2	0	0.9	0	0.2	56.3				33.5			0
19.9	4.5		1.0	0	0	0.5	0.6	19.8	4.4		0.4	19.4	6.4		1.3	4.0	45	0	0	2.0		31.2	13.6		-1.9	+3.7	1.6	33.0	17.3	1.5	0	0	0	1.5	0	1.0	0.1	0.2	37.1				34.8			0
18.1	4.1		0.8	0	0	0.5	0.6	17.8	3.9		0.4	17.4	5.8		1.0	2.8	45	0	0	2.0		31.7	11.0		-1.8	+5.7	1.5	31.6	16.7	1.3	0	0	0	1.3	0	1.0	0.1	0.3	116.1				32.4			0
18.1	4.1		0.7	0	0	0.5	0.6	17.9	3.9		0.4	17.4	5.8		0.9	2.8	45	0	0	1.9		27.5	10.2		-1.9	+7.0	2.6	32.6	17.2	1.4	0	0	0	1.4	0	0.9	0.1	0.3	146.1				29.2			0
21.3	4.9		0.7	0	0	0.5	0.6	20.9	4.6		0.4	20.5	6.9		1.0	2.8	45	0	0	2.1		30.9	11.5		-2.1	+2.4	4.4	31.2	13.9	1.5	0	0	0	1.5	0	1.1	0.2	0.4	174.3				30.3			0
34.2	7.8		0.8	0	0.8	0	1.0	33.2	7.3		0.7	32.5	10.8		0.8	1.6	40	0	0.8	3.6		43.3	11.0		-3.6	+3.2	4.2	42.9	14.2	10.0	24.0	0	5.0	53.0	4.2	1.2	6.0	0.5	158.3				54.7			24.0
34.2	7.8		5.2	0	4.0	0	1.1	34.3	7.5		0.7	33.6	11.2		3.8	1.3	40	0	4.0	5.8		60.5	31.8		-2.1	+22.0	6.7	70.4	53.8	47.1	40.8	16.3	19.0	123.2	6.7	1.4	7.9	1.1	96.3				56.7			62.7
38.8	7.5		18.0	0.7	4.0	0	2.5	43.6	9.6		0.9	42.7	14.2		10.2	3.4	40	0.7	4.0	5.1		70.1	122.0		+5.7	+26.2	12.3	102.0	148.2	135.5	0	14.8	11.0	161.2	12.3	1.6	7.9	1.1	22.1				86.2			45.2
25.3	5.8		5.5	0	4.0	0	0.8	26.0	5.7		0.5	25.5	8.6		3.1	1.9	40	0	4.0	2.6		41.1	59.8		+2.1	+6.7	6.2	49.9	66.5	60.2	0	0	2.0	62.3	6.2	1.8	0	0.5	1.2				37.0			123.8
26.3	6.0		1.6	0	1.6	0	0.8	25.6	5.6		0.5	25.0	8.3		1.3	2.4	40	0	1.6	2.7		37.0	28.2		-1.0	+11.7	2.1	47.7	39.7	37.8	0	0	0	37.8	2.1	1.6	0	0.1	7.3				37.2			81.8
23.6	5.4		2.0	0	2.0	0	0.7	22.8	5.0		0.5	22.3	7.4		1.7	2.8	40	0	2.0	2.4		35.2	17.1		-2.0	+2.0	4.8	35.2	19.1	14.3	0	0	0	14.3	4.8	1.4	0	0.2	21.8				32.9			5.2
292.2	66.7		39.8	0.7	18.2	2.5	10.4	340.2	66.0		6.2	294.0	97.7		28.4	33.9	50.5	0.7	18.2	32.2		457.9	349.0		-11.9	+100.3	52.8	546.3	449.3	329.6	74.8	33.1	41.0	477.5	35.8	15.0	22.3	5.2	—	0	0		467.7	0		361.2
19.5	4.4		1.4	0	1.4	0	0.6	18.5	4.2		0.4	18.5	6.1		1.3	3.1	40	0	1.4	2.0		30.3	14.6		-1.7	-2.0	3.1	26.6	12.6	9.5	0	2.2	0	11.7	3.1	1.1	0	0.4	32.1				33.9			3.6
21.3	4.9		1.5	0	0	0.5	0.7	21.6	4.8		0.4	21.2	7.0		1.4	3.9	45	0	0	2.2		32.2	14.3		-2.1	+3.2	3.4	34.3	17.5	1.3	0	0	0	1.3	0	0.9	0	0.3	63.9				33.7			0
24.7	5.6		0.9	0	0	0.5	0.8	24.3	5.3		0.5	23.8	7.9		1.3	4.7	45	0	0	2.6		36.9	14.3		-2.5	+7.1	4.1	41.5	21.4	1.2	0	0	0	1.2	0	1.0	0.1	0.2	103.0				34.8			0
23.3	5.3		0.8	0	0	0.5	0.7	22.9	5.0		0.5	22.4	7.4		1.1	4.7	45	0	0	2.4		35.1	12.5		-2.5	+9.1	2.7	40.7	20.6	1.2	0	0	0	1.2	0	1.0	0.1	0.3	141.2				32.8			0
19.9	4.5		1.8	0	0	0.5	0.6	19.6	4.3		0.4	19.2	6.4		1.0	3.8	45	0	0	2.0		30.5	11.3		-2.1	+5.3	3.9	33.7	16.6	1.1	0	0	0	1.1	0	0.9	0.1	0.4	172.6				31.0			0
21.0	4.8		0.8	0	0	0.5	0.6	20.7	4.6		0.4	20.3	6.7		1.0	2.7	45	0	0	2.1		30.6	11.3		-2.1	+2.6	4.3	31.1	13.9	1.3	0	0	0	1.3	0	1.1	0.1	0.4	200.9				30.0			0
15.3	3.5		1.0	0	1.0	0	0.5	14.8	3.3		0.2	14.5	4.8		1.0	2.0	40	0	1.0	1.6		24.2	17.6		-0.7	-1.2	4.3	23.3	17.4	13.1	52.8	0	13.0	78.9	4.3	1.2	7.9	0.9	137.8				32.1			53.5
18.7	4.3		3.7	0	4.0	0	0.7	22.7	5.0		0.5	22.2	7.4		6.2	2.7	40	0	4.0	2.2		40.8	67.0		+2.9	-6.0	4.4	47.7	61.0	56.6	24.9	75.8	9.0	166.3	4.4	1.4	7.9	0.9	2.5				34.2			177.4
27.3	6.2		3.2	0	3.2	0	0.8	26.5	5.8		0.5	26.0	8.6		1.8	1.6	40	0	3.2	2.7		39.3	34.8		-0.5	-4.3	4.8	34.6	30.5	25.7	0	0	0	25.9	4.8	1.6	0	0.1	4.8				38.2			275.1
26.0	5.9		3.0	0	3.0	0	0.8	26.2	6.5		0.5	24.7	8.2		1.7	1.6	40	0	3.0	2.7		37.7	21.2		-1.3	-3.4	4.7	32.5	17.8	13.1	0	0	0	13.1	4.7	1.8	0	0.1	17.6				36.8			306.1
23.2	5.3		2.4	0	2.4	0	0.7	22.5	5.0		0.4	22.1	7.3		2.0	3.9	40	0	2.4	2.3		36.1	20.7		-1.7	-0.1	4.2	34.3	20.6	16.4	0	0	0	16.4	4.2	1.6	0	0.4	29.3				37.3			240.5
23.3	5.3		1.8	0	1.8	0	0.7	22.6	5.0		0.5	22.1	7.3		1.5	2.7	40	0	1.8	2.4		34.5	16.0		-2.0	-3.3	3.5	29.2	12.7	9.2	0	0	0	9.2	3.5	1.4	0	0.6	43.8				32.7			34.9
263.5	60.0		26.3	0	16.8	2.5	8.2	262.3	57.8		5.3	257.0	85.1		21.4	36.3	50.5	0	16.8	27.2		409.2	255.6		-16.8	+ 7.0	47.4	359.4	262.6	149.7	78.7	78.0	22.0	328.4	29.0	15.0	16.2	5.0	-	0	0		404.5	0		1095.4
18.2	4.1		1.4	0	1.4	0	0.5	17.7	3.9		0.4	17.3	5.7		1.3	3.0	40	0	1.4	1.9		28.9	15.3		-1.5	-2.3	2.4	25.1	13.0	10.6	0	0	0	10.6	2.4	1.1	1.4	0.6	54.2				33.5			14.6
18.8	4.3		1.3	0	0	0.5	0.6	19.0	4.2		0.4	18.6	6.2		1.3	3.6	45	0	0	2.0		30.0	13.9		-1.8	-1.4	3.7	26.8	12.5	1.2	0	0	0	1.2	0	0.9	0	0.3	78.6				33.5			0
19.8	4.5		1.0	0	0	0.5	0.6	19.7	4.3		0.4	19.3	6.4		1.3	4.2	45	0	0	2.0		31.3	13.9		-1.9	-1.1	3.3	28.3	12.8	1.1	0	0	0	1.1	0	1.0	0.1	0.2	104.6				34.7			0
18.4	4.2		0.9	0	0	0.5	0.6	18.2	4.0		0.4	17.8	5.9		1.2	3.7	45	0	0	2.0		29.2	12.7		-1.8	+2.2	3.7	29.6	14.9	1.4	0	0	0	1.4	0	1.0	0.1	0.3	131.5				32.7			0
15.1	3.4		0.7	0	0	0.5	0.5	14.8	3.3		0.3	14.5	4.8		1.0	2.9	45	0	0	1.6		24.5	10.5		-1.5	+1.4	3.8	24.4	11.9	1.2	0	0	0	1.2	0	0.9	0.1	0.3	153.5				28.0			0
20.1	4.6		0.7	0	0	0.5	0.6	19.7	4.3		0.4	19.3	6.4		1.0	2.5	45	0	0	2.1		29.4	10.8		-2.0	-0.5	4.1	26.9	10.3	1.6	0	0	0	1.6	0	1.1	0.2	0.3	172.4				29.9			0
8.4	1.9		0.7	0	0.7	0	0.3	8.1	1.8		0.2	7.9	2.6		0.7	1.4	40	0	0.7	0.9		15.6	11.8		-0.4	-2.3	2.9	12.9	9.5	6.6	50.9	9.7	10.0	77.2	2.9	1.2	7.7	0.8	108.2				20.8			66.9
19.1	4.4		2.9	0	2.9	0	0.6	18.5	4.1		0.4	18.1	6.0		2.1	0.7	40	0	2.9	2.0		29.8	19.0		-1.2	+19.0	6.5	49.6	38.0	31.5	0	25.7	15.0	72.2	6.5	1.4	+6.0	0.8	74.9				34.7			102.8
342	7.8		25.5	3.6	4.0	0	1.5	43.6	9.6		0.9	42.7	14.2		14.5	4.3	40	3.6	4.0	11.2		84.3	121.2		+4.1	+32.6	14.7	132.0	153.8	139.1	0	0	0	139.1	14.7	1.6	3.9	0.9	39.6				56.0			84.2
34.2	7.8		13.0	0	4.0	0	1.3	41.9	9.2		0.8	41.1	13.6		7.4	2.8	40	0	4.0	3.9		63.2	94.4		+3.4	+14.4	9.3	81.0	108.8	99.5	0	0	0	99.5	9.3	1.8	0	0.7	23				52.1			125.5
34.2	7.8		3.2	0	3.2	0	1.0	33.2	7.3		0.7	32.5	10.8		2.7	3.8	40	0	3.2	4.7		50.9	59.0		+0.9	+12.2	7.6	64.0	71.2	63.6	0	0	0	63.6	7.6	1.6	0	0.4	0.1				48.2			118.0
23.8	5.4		3.1	0	3.1	0	0.7	23.1	5.1		0.5	22.6	7.5		2.6	3.7	40	0	3.1	2.5		38.5	26.0		-1.4	+ 9.5	4.5	46.6	35.5	31.0	0	0	0	31.0	4.5	1.4	0	0	9.8				32.8			8.4
244.3	60.2		54.4	3.6	19.3	2.5	15.8	277.5	61.1		5.8	276.7	90.1		37.1	36.6	50.5	3.6	19.3	36.8		455.6	408.5		-5.1	+83.7	66.5	594.2	492.2	388.4	50.9	35.4	25.0	499.7	47.9	15.0	23.5	5.6	—	0	0		436.9	0		526.4

al flow.
Col. 49

17/ Col. 44 + 47 + 48 - 49 - 50 - 51.
18/ Col. 52 - 55.

19/ Col. 41 + 50.
20/ Cols. 53 + 43 + 51 + 55.

21/ Includes any spills in Col. 52.

22/ Winter releases include Pueblo municipal water and other nonstorable winter flows.

23/ Winter storage less Pueblo Reservoir evaporation for preceding year.
24/ Does not go through Power Plant.

NOTE:
Water in thousands of acre-feet.
Power in millions of kilowatthours.

DEC. 1949

| Water year | Month | SUGAR LOAF RESERVOIR | | | | | | | | ELBERT POWERPLANT | | | | | | | | | SNOWDEN DIVERSION | | | | | | | | TWIN LAKES RESERVOIR | | | | | | | | | | | | WAPACO POWERPLANT | | | | | WAPACO INTERCEPTION AND PRINCETON POWERPLANT | | | | | | | | JOHNSON POWERPLANT | | | | | | | | | SALIDA POWERPLANT | | | | |
|---|---|---

Con't.

ANT Total flow to Princeton Power Plant (44) 13/	ANT Power generated at Princeton Power Plant (45)	JOHNSON POWERPLANT (46)	Chalk Creek 60.6 sq. mi. (47)	Chalk Creek spills (48) 14/	Irrigation by-pass for Chalk Creek land (49) 15/	Fish flow by-pass Chalk Creek (50) 16/	Canal loss 3% & interception loss (51)	Total flow thru Johnson Power Plant (52) 17/	Power generated at Johnson Power Plant (53)	SALIDA POWERPLANT (54)	Canal loss 2% (55)	Total flow thru Salida Power Plant (56) 18/	Power generated at Salida Power Plant (57)	SALIDA GAGE (58)	Cottonwood Creek 71.0 sq. mi. (59)	488.8 sq. mi. uncontrolled area (60)	Accumulated fish flows (61) 19/	Return of Chalk Creek spills (Col.48) (62)	Return of Chalk Creek irr. by-pass (Col. 49) (63)	Canal loss returns plus spills below Granite Power Plant (64) 20/	(65)	Project operation flow to Salida Gage (66) 21/	Historical recorded flow to Salida Gage (67)	PUEBLO RESERVOIR OPERATION (68)	Transportation loss 11% (69)	Gain between Salida and Pueblo (70)	Historical diver. of Bessemer Ditch (71)	Project operation flow to Pueblo Reservoir (72)	Historical recorded to Pueblo Res. (73) 22/	Historical recorded flow released below Pueblo Res. (74) 23/	Winter storage Arkansas R. water released (75)	Project supplemental irr. water released (76)	Independence Pass water released (77)	Total release thru Pueblo Power Plant (78) 24/	Historical Bessemer Ditch Diver. released (79) 24/	Valley Municipal water release (80)	Power generated at Pueblo Power Plant (81)	Reservoir evaporation (82)	Reservoir content end of month (83)	Project water spills (84)	Winter Arkansas River water spills (85)	(86)	Total power generated at all Power Plants (87)	Flood flows stored (88)	(89)	Pre-Project Headgate shortage (90)
.244	5.6		2.0	0	2.0	0	0.7	23.7	5.2		0.5	23.2	7.7		1.9	3.9	4.0	0	2.0	2.5		32.5	20.5	-1.9	+ 3.8	3.6	39.4	24.3	21.7	0	0	0	21.7	3.6	1.1	0	0.2	22.6				34/			5.2
18.9	4.3		1.8	0	0	0.5	0.6	19.6	4.3		0.4	19.2	6.4		1.7	4.7	4.5	0	0	2.0		32.1	14.4	-1.7	+ 8.8	0	39.2	25.2	6.1	0	0	0	1.1	0	0.9	0	0.2	59.6				32.6			0
19.8	4.5		1.0	0	0	0.5	0.6	19.7	4.3		0.4	19.3	6.4		1.3	4.0	4.5	0	0	2.0		31.1	14.6	-1.8	+ 4.9	1.3	34.2	19.5	1.0	0	0	0	1.0	0	1.0	0.1	0.2	91.6				34.7			0
18.3	4.2		0.9	0	0	0.5	0.6	18.1	4.0		0.4	17.7	5.9		1.3	3.7	4.5	0	0	2.0		29.2	13.6	-1.7	+ 5.8	4.0	33.3	19.4	1.7	0	0	0	1.7	0	1.0	0.1	0.3	122.4				32.7			0
28.4	6.5		0.9	0	0	0.5	0.9	27.9	6.1		0.6	27.3	9.1		1.7	3.7	4.5	0	0	3.0		39.7	12.5	-3.0	+ 4.5	1.8	44.2	17.0	1.3	0	0	0	1.3	0	0.9	0.1	0.3	164.1				46.5			0
34.2	7.8		0.9	0	0	0.5	1.0	33.6	7.4		0.7	32.9	10.9		1.2	3.1	4.5	0	0	3.5		45.2	13.0	-3.5	- 1.6	4.3	46.1	12.4	1.7	0	0	0	1.7	0	1.1	0.2	0.4	199.0				47.9			0
30.5	6.7		1.7	0	1.2	0	0.8	28.9	6.4		0.4	28.5	6.5		1.3	2.3	4.0	0	1.2	2.1		30.4	15.0	+0.5	- 5.7	4.4	25.2	29.3	24.9	40.1	0	8.0	73.0	44.2	1.2	2.9	0.9	114.7				37.4			40.1
34.2	7.8		1.7	0.5	4.0	0	1.1	35.6	7.8		0.7	34.9	11.8		1.2	4.4	4.0	0.5	4.0	6.5		74.8	10.8.0	+2.7	+17.1	11.2	95.6	125.1	113.9	39.9	0	6.0	159.8	11.2	1.4	7.9	1.0	66.9				48.4			39.9
34.2	7.8		1.92	0.9	4.0	0	1.1	36.3	8.0		0.7	35.6	11.8		1.2	3.6	4.0	0.4	4.0	5.3		112.4	120.4	+1.0	- 3.2	12.0	115.2	123.2	111.2	1.6	22.2	11.0	158.0	12.0	1.6	7.9	0.8	14.7				70.0			49.1
34.2	7.8		7.2	0	4.0	0	1.1	36.3	8.0		0.7	35.6	11.8		4.1	2.2	4.0	0	4.0	33.3		86.6	77.2	-1.0	+ 10.6	9.0	96.2	97.8	28.8	0	15.9	5.0	99.7	9.0	1.8	0	0.4	0				57.2			50.2
34.2	7.8		7.3	0	4.0	0	1.1	36.4	8.0		0.7	35.7	11.9		6.1	7.4	4.0	0	4.0	16.0		73.2	71.4	-0.2	+ 4.6	11.2	120.6	119.0	102.8	0	0	0	102.8	11.2	1.6	0	0	0				56.0			48.4
23.8	5.4		3.0	0	3.0	0	0.7	23.1	5.1		0.5	22.6	7.5		2.5	3.6	4.0	0	3.0	2.4		38.1	28.8	-1.0	+ 6.5	4.9	43.6	35.3	30.4	0	0	0	30.4	4.9	1.4	0	0	6.9				32.7			0
325.1	74.2		63.1	1.4	22.2	2.5	1.6.6	345.5	76.0		7.1	338.4	112.5		46.2	46.6	50.5	1.4	22.2	126.6		615.3	557.4	-10.6	+100.1	67.7	724.8	637.5	495.0	81.6	45.1	30.0	651.7	56.3	15.0	24.2	4.7	—	0	0		572.2	0		263.5
23.5	5.4		2.2	0	2.2	0	0.7	22.8	5.0		0.5	22.3	7.4		2.1	4.4	4.0	0	2.2	2.4		32.4	23.3	-1.6	+11.1	4.6	46.9	34.4	28.0	0	0	0	30.0	4.4	1.1	0	0.1	18.2				34.1			0
23.7	5.4		1.7	0	0	0.5	0.7	24.2	5.3		0.5	23.7	7.8		1.7	4.5	4.5	0	0	2.4		36.8	17.8	-2.1	+10.9	1.6	45.4	21.7	1.2	0	0	0	1.2	0	0.9	0	0.2	61.8				33.7			0
20.0	4.6		1.1	0	0	0.5	0.6	20.0	4.4		0.4	19.6	6.5		1.4	5.1	4.5	0	0	2.0		32.6	16.1	-1.3	+ 7.7	2.3	38.5	23.8	1.2	0	0	0	1.2	0	1.0	0.1	0.2	97.6				34.8			0
18.5	4.2		1.0	0	0	0.5	0.6	18.4	4.0		0.4	18.0	6.0		1.3	4.8	4.5	0	0	2.0		30.6	13.8	-1.3	+ 5.6	2.0	38.4	17.4	1.5	0	0	0	1.5	0	1.0	0.1	0.3	127.2				32.6			0
15.1	3.4		0.8	0	0	0.5	0.5	14.9	3.3		0.3	14.6	4.8		1.1	4.1	4.5	0	1.1	1.6		25.9	12.2	-1.5	+ 9.2	2.3	33.6	21.4	1.4	0	0	0	1.4	0	0.9	0.1	0.3	158.2				27.8			0
16.4	3.7		0.8	0	0	0.5	0.5	16.2	3.6		0.3	15.9	5.9		1.1	3.2	4.5	0	0	1.7		26.4	12.7	-1.5	+ 7.3	4.5	32.2	20.0	1.6	0	0	0	1.6	0	1.1	0.2	0.4	187.3				30.0			0
17.9	4.1		1.0	0	1.0	0	0.5	17.4	3.8		0.3	17.1	6.7		1.0	1.9	4.0	0	1.0	1.7		26.7	20.6	-0.7	+ 6.8	5.0	32.8	27.4	22.4	31.9	0	5.0	59.3	5.0	1.2	6.9	0.8	153.2				32.1			31.9
17.5	4.0		9.5	0	4.0	0	0.7	22.8	4.9		0.4	21.9	7.3		6.8	2.4	4.0	0	4.0	2.0		41.1	7.3	+3.4	+10.7	7.9	58.2	73.3	75.1	67.8	23.7	0	166.6	7.9	1.4	7.9	1.1	32.0				39.5			129.3
34.2	7.8		8.7	0	4.0	0	1.2	37.7	8.3		0.8	36.9	12.3		4.9	2.4	4.0	0	4.0	2.8		54.0	74.7	+2.1	+ 2.7	8.8	60.8	77.4	62.6	0	0	0	62.6	8.3	1.6	0	0.6	132				60.2			142.8
25.9	5.9		7.1	0	4.0	0	0.9	28.1	6.2		0.6	27.5	8.1		4.0	2.7	4.0	0	4.0	2.9		44.6	57.2	+1.4	- 2.2	6.6	49.8	55.0	48.4	0	0	0	48.4	6.6	1.8	0	0.2	0				37.9			211.8
24.7	6.1		2.5	0	2.5	0	0.8	25.9	5.7		0.5	25.4	8.4		2.1	3.1	4.0	0	2.5	2.7		39.8	31.8	-0.9	+ 11.0	6.5	49.9	42.8	36.3	0	0	0	36.3	6.5	1.6	0	0	5.5				37.2			121.5
28.3	5.3		1.8	0	1.8	0	0.7	22.1	5.3		0.5	22.1	7.3		1.5	2.8	4.0	0	1.8	2.4		34.3	11.5	-2.0	+ 3.3	5.1	35.6	19.8	14.7	0	0	0	14.7	5.1	1.4	0	0.1	19.8				32.6			3.0
2627	59.9		38.2	0	19.5	2.5	8.4	270.3	59.5		5.5	265.0	82.9		29.0	40.6	50.5	0	19.5	27.6		432.2	369.0	-7.0	+ 82.1	57.0	507.8	451.1	302.4	99.7	23.7	5.0	430.8	44.3	15.0	15.3	4.3	—	0	0		416.5	0		695.3
22.8	5.2		1.3	0	1.3	0	0.7	22.1	4.7		0.4	21.7	7.2		1.2	3.0	4.0	0	1.3	2.3		33.6	15.5	-2.0	+ 1.5	4.4	33.0	17.0	12.6	0	0	0	12.6	4.4	1.1	0	0.3	34.4				33.7			29
18.9	4.3		1.2	0	0	0.5	0.6	19.0	4.2		0.4	18.6	6.2		1.1	3.0	4.5	0	0	2.0		29.2	13.1	-1.8	+ 1.8	0	29.2	14.9	1.3	0	0	0	1.3	0	0.9	0	0.3	61.1				33.7			0
19.8	4.5		1.0	0	0	0.5	0.6	19.7	4.3		0.4	19.3	6.4		1.3	4.3	4.5	0	0	2.0		31.4	14.4	-1.9	+ 6.9	3.2	36.4	21.3	1.3	0	0	0	1.3	0	1.0	0.1	0.2	95.0				34.7			0
18.4	4.2		0.9	0	0	0.5	0.6	18.2	4.0		0.4	17.8	5.9		1.3	4.1	4.5	0	0	2.0		29.7	13.6	-1.8	+ 5.0	2.8	32.9	18.6	1.4	0	0	0	1.4	0	1.0	0.1	0.3	125.2				32.6			0
15.1	3.4		0.8	0	0	0.5	0.5	14.9	3.3		0.3	14.6	4.8		1.1	3.8	4.5	0	1.1	1.6		25.6	12.1	-1.5	+ 4.9	3.9	34.0	17.0	1.1	0	0	0	1.1	0	0.9	0.1	0.3	157.9				27.8			0
16.4	3.7		0.9	0	0	0.5	0.5	16.8	3.6		0.3	16.0	5.3		1.2	2.9	4.5	0	0	1.7		86.3	13.5	-1.5	+ 2.7	4.4	27.6	15.8	1.4	0	0	0	1.4	0	1.1	0.1	0.4	126.5				29.9			0
27.6	6.3		0.8	0	0.8	0	0.8	26.8	5.9		0.8	26.3	8.7		0.9	1.5	4.0	0	0.8	2.7		36.2	17.5	-2.1	+ 2.6	4.3	36.7	20.1	15.8	32.9	0	8.0	56.7	4.3	1.2	6.4	0.8	150.2				45.7			32.9
34.2	7.8		4.6	0	4.0	0	1.0	33.8	7.4		0.7	33.1	11.0		3.3	1.3	4.0	0	4.0	2.6		49.2	46.8	-0.3	+ 1.8	6.0	52.7	55.6	49.6	43.9	34.8	2.0	120.3	6.0	1.4	7.9	1.0	79.2				55.6			84.8
34.2	7.8		19.4	1.0	4.0	0	1.0	43.6	9.6		0.9	42.7	14.2		11.0	3.6	4.0	1.0	4.0	24.5		90.8	145.0	+6.0	+ 30.8	19.2	127.6	175.8	156.6	0	20.8	0	177.4	19.2	1.6	7.9	1.0	7.6				68.4			34.4
34.2	7.8		9.3	0	4.0	0	1.2	33.5	8.4		0.8	37.5	12.4		5.3	2.4	4.0	0	4.0	35.8		89.0	83.1	-0.6	+ 10.9	8.7	99.3	74.0	85.3	0	11.0	0	96.3	8.7	1.8	0	0.1	0				58.7			83.3
34.2	7.8		2.1	0	2.1	0	1.0	33.2	7.3		0.7	32.5	10.8		1.7	2.8	4.0	0	2.1	13.4		66.5	54.7	-0.2	+ 13.6	8.0	69.9	68.3	60.8	0	0	0	60.8	8.0	1.6	0	0	0				50.9			29.7
24.1	5.5		4.2	0	4.0	0	0.7	23.6	5.2		0.5	23.1	7.7		3.5	4.7	4.0	0	4.0	2.5		41.8	34.1	-0.8	+ 28.3	8.4	69.8	62.4	54.0	0	0	0	54.0	8.4	1.4	0	0	5.5				32.8			0
2229	68.3		46.5	1.0	20.2	2.5	13.2	302.5	67.9		6.3	303.8	100.6		32.9	37.4	50.5	1.0	20.2	94.0		539.8	463.0	-8.5	+117.8	73.3	642.5	580.8	440.7	76.8	56.6	10.0	584.1	59.0	15.0	22.6	4.7	—	0	0		498.8	0		319.0
20.0	4.6		2.2	0	2.2	0	0.6	19.4	4.3		0.4	19.0	6.2		2.1	4.4	4.0	0	2.2	2.0		33.7	24.8	-1.0	+ 6.1	3.5	38.8	30.9	22.4	0	0	0	23.4	3.5	1.1	0	0.1	12.2				34.1			0
23.6	5.4		1.8	0	0	0.5	0.7	24.2	5.3		0.5	23.7	7.9		1.7	4.4	4.5	0	0	2.4		36.7	18.6	-2.0	+11.8	0.2	46.5	30.4	1.3	0	0	0	1.8	0	0.9	0	0.1	56.4				22.8			0
24.5	5.6		1.3	0	0	0.5	0.8	24.5	6.4		0.5	24.0	8.0		1.7	5.3	4.5	0	0	2.6		38.1	17.4	-2.3	+ 8.5	4.4	44.3	25.9	1.3	0	0	0	1.3	0	1.0	0.1	0.2	98.2				24.8			0
18.5	4.2		1.1	0	0	0.5	0.6	18.5	4.1		0.4	18.1	6.0		1.5	4.5	4.5	0	0	2.0		30.6	14.8	-1.7	+ 6.6	2.4	36.6	21.4	1.3	0	0	0	1.3	0	1.0	0.1	0.2	131.2				32.9			0
15.1	3.4		0.8	0	0	0.5	0.5	14.9	3.3		0.3	14.6	4.8		1.1	3.4	4.5	0	0	1.5		28.1	11.8	-1.5	+ 10.2	1.4	33.8	22.0	1.2	0	0	0	1.2	0	0.9	0.1	0.3	162.6				27.9			0
18.5	4.2		1.0	0	0	0.5	0.6	18.4	4.0		0.4	18.0	6.0		1.4	3.1	4.5	0	0	2.0		29.0	13.7	-1.7	+ 6.6	3.0	33.9	20.5	1.4	0	0	0	1.4	0	1.1	0.2	0.4	198.6				29.9			0
23.3	5.3		1.0	0	1.0	0	0.7	22.6	5.0		0.5	22.1	7.8		1.1	2.2	4.0	0	1.0	2.4		32.8	24.3	-0.9	+ 0.3	4.2	32.2	24.6	20.4	31.4	0	7.0	48.8	4.2	1.2	5.7	0.9	170.7				38.7			31.4
34.2	7.8		9.2	0	4.0	0	1.2	38.2	8.4		0.8	37.4	12.4		6.6	2.2	4.0	0	4.0	3.8		58.0	76.1	+4.2	+ 2.4	7.6	64.6	78.5	98.9	83.2	0	2	174.1	7.6	1.4	7.9	1.2	51.0				58.0			83.2
34.2	7.8		8.6	0	4.0	0	1.9	36.9	8.1		0.7	36.2	12.0		4.9	2.2	4.0	0	4.0	13.9		68.2	55.6	+2.2	+ 0.9	6.0	68.3	76.5	80.5	4.4	21.9	0	106.8	6.0	1.6	7.9	0.8	4.1				60.6			137.2
34.2	7.8		3.9	0	3.9	0	1.0	33.2	7.3		0.7	32.5	10.8		2.7	1.8	4.0	0	3.9	3.5		47.9	50.3	+0.8	- 2.8	6.0	45.4	47.5	41.5	0	0	0	41.5	6.0	1.8	0	0.1	0.1				48.7			210.2
26.6	6.1		2.1	0	2.1	0	0.8	25.8	5.7		0.5	25.3	8.4		1.8	2.3	4.0	0	2.1	2.7		35.7	36.6	-0.2	+ 0.3	5.1	38.2	36.3	31.2	0	0	0	31.2	5.1	1.6	0	0	0.4				37.2			154.1
23.3	5.3		1.7	0	1.7	0	0.7	22.6	5.0		0.5	22.1	7.3		1.4	2.5	4.0	0	1.7	2.4		34.1	17.7	-1.8	- 2.7	3.3	29.6	15.0	11.7	0	0	0	11.7	3.3	1.4	0	0	13.6				32.6			41.0
296.0	67.5		34.7	0	18.9	2.5	10.1	299.2	65.9		6.2	293.0	97.2		27.5	38.8	50.5	0	18.9	41.2		469.9	411.9	-6.4	+ 47.6	47.1	511.1	459.5	310.1	189.0	21.9	7.0	448.0	38.7	15.0	22.0	4.3	—	0	0		468.2	0		649.7
19.8	4.6		1.1	0	1.1	0	0.6	18.7	4.1		0.4	18.3	6.1		1.0	2.7	4.0	0	1.1	2.0		29.1	12.8	-1.8	- 0.1	3.7	32.2	17.7	9.0	0	0	2	9.0	8.7	1.1	0	0.2	26.8				32.8			11.4
18.7	4.3		1.6	0	0	0.5	0.6	18.6	4.1		0.4	18.2	6.0		1.0	2.4	4.5	0	0	2.0		28.1	11.8	-1.8	+ 2.0	4.2	28.3	13.8	1.8	0	0	0	1.3	0	0.9	0	0.2	58.7				33.3			0
19.7	4.5		0.8	0	0	0.5	0.6	19.4	4.3		0.4	19.0	6.3		1.1	3.3	4.5	0	0	2.0		29.9	11.7	-2.0	+ 2.3	1.4	30.2	14.0	1.8	0	0	0	1.3	0	1.0	0.1	0.2	80.4				34.6			0
18.2	4.1		0.9	0	0	0.5	0.6	18.0	4.0		0.4	17.6	5.9		1.2	3.5	4.5	0	0	2.0		28.8	12.4	-1.8	+ 6.6	2.7	32.6	19.0	1.5	0	0	0	1.5	0	1.0	0.1	0.3	111.2				32.5			8
14.8	3.4		0.8	0	0	0.5	0.5	14.6	3.2		0.3	14.3	4.7		1.0	3.6	4.5	0	0	1.6		25.0	11.1	-1.5	+ 7.7	1.8	31.2	18.8	1.4	0	0	0	1.4	0	0.9	0.1	0.3	139.8				20.8			0
12.0	2.7		2.8	0	0	0.5	0.4	11.9	2.6		0.2	11.7	3.9		1.0	2.6	4.5	0	0	1.2		21.0	11.5	-1.0	+ 3.7	4.3	28.7	15.2	1.6	0	0	0	1.6	0	1.1	0.2	0.3	160.5				22.2			0
12.2	2.8		0.6	0	0.6	0	0.4	11.8	2.6		0.2	11.6	3.9		1.6	1.1	4.0	0	0.6	1.2		19.1	10.0	-1.0	- 0.6	3.8	17.5	9.4	5.6	52.1	0	2.0	60.7	2.8	1.2	6.7	0.8	111.5				24.1			52.1
13.9	3.2		4.0	0	4.0	0	0.4	13.5	3.0		0.3	13.2	4.4		2.9	0.9	4.0	0	4.0	1.4		26.4	40.4	+1.5	- 0.9	4.5	27.0	39.5	35.0	16.3	35	0	59.8	4.5	1.4	5.8	0.9	71.9				25.0			117.7
14.7	3.4		3.8	0	3.8	0	0.4	14.3	3.1		0.4	14.0	4.6		2.1	1.7	4.0	0	3.8	1.5		27.1	60.7	+3.6	- 1.7	4.7	28.0	58.5	54.3	0	0	0	54.3	4.2	1.6	4.6	0.9	39.9				25.6			165.5
19.6	4.5		3.1	0	3.1	0	0.6	19.0	4.2		0.4	18.6	6.2		1.7	1.6	4.0	0	3.1	2.0		31.0	32.5	+0.2	- 1.8	4.4	29.4	30.7	26.8	0	0	0	26.8	4.4	1.8	0	0.7	36.1				27.7			158.0
19.9	4.5		1.5	0	1.5	0	0.6	19.3	4.2		0.4	18.9	6.3		1.2	2.4	4.0	0	1.5	2.0		30.0	24.2	-0.6	- 1.4	4.7	28.0	22.8	18.1	0	0	0	18.1	4.7	1.6	0	0.8	32.9				27.9			137.9
17.6	4.0		1.5	0	1.5	0	0.5	17.1	3.8		0.3	16.8	5.6		1.2	2.2	4.0	0	1.5	1.7		27.4	16.3	-1.2	+ 5.6	4.1	31.8	21.9	17.8	0	0	0	17.8	4.1	1.4	0	0.7	46.7				24.7			11.7
2004	45.8		19.9	0	15.6	2.5	6.2	196.2	48.2		4.0	192.2	62.8		16.0	23.0	50.5	0	15.6	20.6		322.9	254.9	-7.4	+ 21.4	43.3	336.9	276.3	178.2	69.4	25	8.0	253.1	29.4	15.0	17.6	6.3		0	0		332.2	0		662.8

or natural flow. cluded in Col. 49

17/ Col. 44 ∓ 47 + 48 - 49 - 50 - 51.
18/ Col. 52 - 55.

19/ Col. 41 ∓ 50.
20/ Cols. 38 ∓ 43 ∓ 51 ∓ 58.

21/ Includes any spills in Col. 32.

22/ Winter releases include Pueblo municipal water and other nonstorable winter flows.

23/ Winter storage less Pueblo Reservoir evaporation for preceding year.
24/ Does not go through Power Plant.

[illegible]
Water in thousands of acre-feet.
Power in millions of kilowatthours.

DEC. 1949

Water year	Month	SUGAR LOAF RESERVOIR: Inflow from Fryingpan River.	Lake Fork of Arkansas River	Irrigation releases for Lake Fork loans	Fish release to Lake Fork	Release to Elbert Canal	Reservoir evaporation	Reservoir content end of month	Reservoir spills	ELBERT POWERPLANT: Halfmoon Creek 24.9 sq. mi.	Halfmoon Creek spills	Irrigation by-pass Halfmoon Creek land	Elbert Canal loss 10%	Total flow thru Elbert Canal	Power generated Elbert Power Plant	SNOWDEN DIVERSION: Inflow from small existing tunnels	182.5 sq. mi. Arkansas R. drainage available at Snowden div.	Fish flow passed at Snowden Divr.	Total available at Snowden Divr.	TWIN LAKES RESERVOIR: Twin Lakes (Independence Pass) Diver.	Lake Creek 108.0 sq. mi.	Total inflow to Twin Lakes	Fish flow released for demand at Granite	Release to Granite Power Plant	Power generated at Granite Power Plant	Reservoir evaporation	Reservoir content end of month	Reservoir spills	WAPACO POWERPLANT: Spills below Granite Power Plant	Clear Creek 67.7 sq. mi.	87.6 sq. mi. above Clear Creek	Total flow thru Wapaco Power Plant	Power generated at Wapaco Power Plant	PRINCETON INTERCEPTION AND POWERPLANT: 79.9 sq. mi. above Granite Gage	28.8 sq. mi. above Wapaco Interception	Fish flow by-passed at Wapaco Interception	Wapaco Interception to Princeton Power Plant	Canal loss 5% & Interception loss	Total flow to Princeton Power Plant	Power generated at Princeton Power Plant	JOHNSON POWERPLANT: Chalk Creek 68.6 sq. mi.	Chalk Creek spills	Irrigation by-pass for Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 5% & interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant	SALIDA POWERP: Canal loss 2%	Total flow thru Salida Power Plant
(1)	(2)	(3)	(4)	(5) 1/	(6) 2/	(7)	(8)	(9) 3/	(10)	(11)	(12)	(13) 4/	(14) 4/	(15)	(16)	(17)	(18) 6/	(19)	(20)	(21) 7/	(22) 8/	(23)	(24)	(25)	(26) 9/	(27) 10/	(28)	(29)	(30)	(31) 11/	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42) 12/	(43)	(44) 13/	(45)	(46)	(47)	(48) 14/	(49) 15/	(50) 16/	(51)	(52)	(53)	(54)	(55)	(56)	(57) 16/
1940	Oct	1.4	0.9	0	0.3	0	0.3	72.4		0.7	0	0	0.1	0.6	0.3	0	3.1	1.8	4.7	1.0	3.0	6.3	1.3	14.1	3.8	0.8	7.4		1.0	0.9	1.80	3.3	0.9	0.3	4.0	0.3	0.9	1.4	4.0	1.2	0	1.2	0	0.5	14.9	3.7	0.3	14.6
	Nov	0.5	0.5	0	0.3	12.5	0.2	58.4		0.5	0	0	1.8	16.2	6.8	0	2.1	1.8	3.9	1.4	2.0	8.0	1.6	11.0	2.8	0.7	14.3		0.7	1.1	13.1	5.3	1.3	0.4	4.0	0.6	0.7	1.3	3.8	1.1	0	1.1	0	0.5	13.0	3.9	0.3	12.7
	Dec	0.1	0.5	0	0.3	12.5	0.1	58.1		0.5	0	0	1.8	16.2	6.8	0	2.1	1.8	3.9	1.9	2.0	8.7	1.7	14.3	3.8	0.7	18.8		0.7	1.1	14.1	5.7	1.3	0.4	4.0	0.6	0.7	1.3	3.8	1.1	0	1.1	0	0.5	13.8	3.1	0.3	13.6
1941	Jan	0	0.8	0	0.3	12.6	0.1	30.5		0.4	0	0	1.8	16.2	6.8	0	1.7	1.8	3.0	1.5	1.9	7.9	1.5	11.0	2.6	0.1	30.3		0.8	1.2	13.0	5.3	1.4	0.4	4.0	0.3	0.7	1.2	3.9	1.0	0	1.0	0	0.5	12.6	2.8	0.3	12.3
	Feb	0	0.4	0	0.3	0	0.1	30.5		0.4	0	0	0	0	0.4	0.2	1.7	1.8	3.7	0.1	1.6	2.3	1.8	18.2	4.8	0.4	12.5		0.7	1.1	20.0	8.1	2.4	0.3	4.0	0.3	1.0	1.3	4.4	1.2	0	1.2	0	0.5	13.0	4.2	0.4	12.8
	Mar	0	0.5	0	0.3	13.6	0.1	3.0		0.4	0	0	1.8	16.2	6.8	0	2.1	1.8	3.9	2.0	1.8	8.5	1.7	13.0	3.4	0.2	16.1		1.0	1.7	17.0	6.9	2.2	0.3	4.0	0.3	0.9	1.2	4.4	1.3	0	1.3	0	0.5	16.3	5.6	0.3	16.0
	Apr	0	0.5	0	0.3	2.0	0.1	1.1		0.5	0	0	0.2	2.3	1.0	0	2.3	1.8	4.1	1.0	1.9	5.4	1.7	18.7	4.4	0.2	0.9		1.6	0.6	20.9	7.5	2.5	0.2	4.0	0.2	1.1	1.3	4.9	1.4	0	1.4	0	0.5	13.4	4.3	0.4	13.2
	May	21.2	2.6	0.9	0	0	0.1	24.0		1.7	22.8	2.2	1.0	28.7	11.8	1.7	22.8	1.8	26.3	4.3	3.5	58.6	6	68.3	17.7	2.3	19.9		16.3	0.7	16.3	6.6	4.2	0.2	4.0	0.4	1.0	1.6	9.4	2.7	0	2.7	0	0.5	21.6	4.8	0.4	21.2
	June	23.5	10.3	0.9	0	0	0.2	22.7		2.5	24.1	2.7	0.9	30.2	12.4	2.5	24.1	1.8	28.4	4.7	4.3	77.8	0	82.8	19.6	2.5	10.2		18.1	0.8	19.0	7.7	4.7	0.2	4.0	0.4	1.1	1.7	10.2	2.9	0	2.9	0	0.5	24.0	5.3	0.4	23.6
	July	8.8	3.2	0.9	0	0	0.4	73.4		3.0	0	1.0	0.3	3.3	1.0	0.2	8.7	1.8	9.5	2.2	2.3	33.9	0.3	36.4	8.6	1.1	7.8		7.9	0.3	8.0	3.3	2.0	0.1	4.0	0.2	0.5	0.8	4.2	1.2	0	1.2	0	0.5	10.3	2.2	0.2	10.1
	Aug	0	1.2	0.9	0	0	0.4	72.3		1.3	0	1.0	0	2.3	0.1	0	9.8	1.8	11.6	2.5	2.4	16.8	3.9	24.1	5.9	1.1	13.0		3.9	1.4	22.1	9.0	2.8	0.1	4.0	0.1	0.6	0.8	4.9	1.4	0	1.4	0	0.5	20.8	4.6	0.4	20.6
1941	Sept	0	0.8	0.8	0	0	0.4	72.9		0.7	0	0.7	0	0	0	0	3.5	1.8	5.3	0.3	2.7	6.2	1.3	22.1	5.2	0.9	11.4.9		1.4	0.9	24.4	9.9	2.9	0.3	4.0	0.3	1.2	1.5	5.4	1.5	0	1.5	0	0.5	22.8	5.0	0.5	22.5
Totals		61.6	21.8	4.4	2.1	72.2	2.5	—	0	18.0	1.0	4.7	2.4	76.1	32.1	4.4	79.0	25.6	78.4	46.5	75.6	276.6	15.0	416.7	98.1	19.7	—	0	0	43.1	12.6	217.4	88.3	12.7	2.7	48.0	9.0	11.4	21.60	49.1	52.3	4.7	19.3	2.5	7.8	236.5	52.3	6.8	231.7
1941	Oct	2.5	1.0	0	0.3	0	0.3	75.8		0.8	0	0	0.1	0.7	0.3	0	3.9	1.8	5.8	0.7	3.5	2.4	1.5	20.1	4.7	0.6	100.1		3.8	1.6	25.5	10.4	0.7	0.3	4.0	0.5	1.3	2.3	5.6	1.6	0	1.6	0	0.5	24.7	5.6	0.5	24.3
	Nov	1.2	1.8	0	1.3	0	0.2	77.3		0.6	0	0	0.1	0.5	0.2	0	2.7	1.8	4.3	0.7	2.5	4.7	1.7	21.5	5.1	0.9	81.2		1.2	1.6	24.3	9.9	1.9	0.5	4.0	0.5	1.2	2.0	5.6	1.6	0	1.6	0	0.5	23.6	5.4	0.5	23.2
	Dec	0.7	2.4	0	0.3	0	0.1	78.0		1.4	0	0	0	0	0.4	0	2.2	1.8	4.0	0.2	1.7	2.8	1.9	22.1	5.2	0.2	57.8		1.2	1.9	25.2	10.2	1.9	0.5	4.0	0.5	1.3	2.3	5.6	1.6	0	1.6	0	0.5	24.2	5.6	0.5	23.8
1942	Jan	0.1	0.4	0	0.3	13.6	0.1	64.5		1.3	0	0	1.8	16.2	6.8	0	1.8	1.8	3.6	1.4	1.9	5.4	1.9	15.4	3.6	0.2	62.4		1.2	2.0	18.6	7.6	2.3	0.4	4.0	0.6	1.0	1.8	4.1	1.2	0	1.2	0	0.5	17.3	4.0	0.4	17.1
	Feb	0	0.4	0	0.3	12.7	0.1	42.8		1.3	0	0	1.8	16.2	6.8	0	1.7	1.8	3.5	1.4	1.7	4.1	1.7	12.9	3.0	0.2	67.1		0.9	1.5	15.3	6.2	2.3	0.4	4.0	0.4	0.8	1.4	3.4	1.0	0	1.0	0	0.5	14.9	3.3	0.3	14.7
	Mar	0	0.4	0	0.3	12.6	0.1	32.8		1.4	0	0	1.1	9.8	4.1	0	1.9	1.8	3.7	2.1	1.6	13.0	1.7	16.2	3.8	0.2	67.8		1.2	1.9	18.8	7.6	2.3	0.3	4.0	0.4	0.9	1.3	4.0	1.1	0	1.1	0	0.5	17.3	4.1	0.4	17.1
	Apr	4.3	1.1	0	0.3	0	0.1	32.9		0.9	0	0	0.1	0.8	0.3	0	4.2	1.8	6.0	0.2	3.7	7.5	1.5	12.7	4.2	0.3	49.8		3.2	1.3	22.2	9.0	2.7	0.3	4.0	0.3	1.1	1.7	4.9	1.4	0	1.4	0	0.5	20.8	4.6	0.4	20.6
	May	17.1	2.5	0.9	0	0	0.2	55.2		1.5	0	1.0	0	2.5	1.0	0.6	15.3	1.8	16.0	3.8	3.3	33.6	0	37.4	8.8	1.2	28.2		5.3	0.3	28.8	11.5	3.7	0.2	4.0	0.3	1.7	2.2	7.1	2.0	0	2.0	0	0.5	29.6	6.6	0.6	29.2
	June	33.6	9.3	0.9	0	0	0.3	99.9		8.4	2.1	1.0	0.5	4.8	2.0	1.2	24.4	4.4	25.7	7.9	9.2	33.6	0	49.7	11.8	1.7	21.1		2.1	0.1	23.3	9.4	3.7	0.2	4.0	0.3	1.5	2.0	6.7	1.8	0	1.8	0	0.5	28.0	6.2	0.5	27.6
	July	26.0	12.7	0.9	0	0	0.3	183.3		4.4	0.1	1.0	0.3	3.0	1.3	0.5	10.6	1.8	11.4	7.7	9.2	43.2	0.3	60.4	14.4	1.9	46.0		4.9	0.3	47.0	18.8	3.7	0.2	4.0	0.3	2.7	3.2	10.4	2.9	0	2.9	0	0.5	45.1	10.1	0.9	44.5
	Aug	11.0	4.0	0.9	0	0	0.5	116.9		1.6	0.1	1.0	0.3	3.1	1.3	0.5	5.9	1.8	7.6	3.1	3.6	16.0	1.3	24.0	5.7	0.8	17.4		2.0	0.1	18.3	7.3	3.7	0.2	4.0	0.3	2.1	2.6	8.4	2.3	0	2.3	0	0.5	17.3	3.9	0.3	17.1
	Aug	0	1.5	0.9	0	0	0.5	82.0		1.6	0	1.0	0.1	0.5	0.3	0.5	5.9	1.8	7.7	1.2	1.6	9.0	1.3	13.9	3.3	0.5	10.6		1.0	0.4	11.0	4.5	3.7	0.2	4.0	0.3	1.0	1.5	5.2	1.4	0	1.4	0	0.5	10.2	2.3	0.2	10.0
1942	Sept	0	0.9	0.8	0	0	0.5	116.5		0.5	0	0	0	0	0	0	2.9	1.8	4.7	0.5	1.2	3.6	1.7	14.9	3.5	0.5	180.6		2.8	1.1	18.8	7.6	2.7	0.3	4.0	0.3	1.0	1.8	4.1	1.2	0	1.2	0	0.5	17.1	4.1	0.4	16.9
Totals		73.7	26.5	4.4	2.1	90.4	2.9	—	0	22.4	1.8	4.7	10.5	95.3	40.2	4.2	84.7	24.5	87.9	56.8	92.4	332.9	14.6	464.6	111.8	17.8	—	0	0	222	48.4	147	62.6	11.8	14.7	4.0	48.0	9.8	15.8	286.8	65.5	49.7	0.9	22.4	2.5	10.8	300.9	66.1	6.1	294.3
1942	Oct	0.7	0.6	0	0.3	2.5	0.3	104.0		0.6	0	0	0.9	4.2	2.5	0	3.0	1.8	4.8	0.3	2.7	13.6	1.7	18.9	4.6	0.3	122.7		2.6	1.4	22.9	9.3	0.5	0.4	4.0	0.4	1.2	2.2.1	5.0	1.4	0	1.4	0	0.5	20.4	4.7	0.4	20.2
	Nov	0.7	0.5	0	0.3	0	0.2	109.7		0.4	0	0	0	0.4	0.2	0	2.0	1.8	3.8	0.5	1.8	3.2	1.9	21.1	5.0	0.6	101.8		1.2	1.8	24.1	9.8	0.3	0.5	4.0	0.5	1.2	2.3.4	5.3	1.5	0	1.5	0	0.5	23.0	5.3	0.5	22.7
	Dec	0.2	0.5	0	0.3	12.5	0.1	92.6		0.5	0	0	1.8	16.2	6.8	0	2.4	1.8	4.2	0.5	2.0	21.4	1.8	13.6	4.1	0.2	803.1		1.1	1.6	20.6	8.3	0.4	0.5	4.0	0.5	1.0	2.0.0	4.6	1.3	0	1.3	0	0.5	19.1	4.4	0.4	18.9
1943	Jan	0.1	0.4	0	0.3	12.6	0.1	75.1		0.4	0	0	1.8	16.2	6.8	0	1.7	1.8	3.5	0.3	1.6	12.0	1.9	12.8	3.2	0.2	804.6		0.9	1.4	18.9	7.7	0.3	0.4	4.0	0.4	0.9	1.6.0	4.0	1.2	0	1.2	0	0.5	16.1	4.0	0.4	15.9
	Feb	0	0.4	0	0.3	12.7	0.1	52.4		0.3	0	0	1.8	16.2	6.8	0	1.7	1.8	3.5	0.3	1.4	12.9	1.9	12.8	3.2	0.2	801.1		0.8	1.3	15.6	6.3	0.3	0.4	4.0	0.4	0.8	1.5.2	3.5	1.0	0	1.0	0	0.5	15.0	3.3	0.3	14.8
	Mar	0	0.4	0	0.3	12.6	0.1	29.8		0.4	0	0	1.8	16.2	6.8	0	1.8	1.8	3.6	0.4	1.6	12.8	1.8	12.8	3.2	0.2	801.1		1.1	1.7	18.0	7.3	0.3	0.3	4.0	0.3	0.9	1.7.4	4.0	1.1	0	1.1	0	0.5	17.2	3.9	0.3	17.0
	Apr	0	0.4	0	0.3	0	0.1	44.0		0.9	0	0	0.1	0.8	0.3	0	2.7	1.8	4.5	0.2	2.5	32.6	1.7	0.5	180.6		2.5	0.2	40.0	0.5	1.8	24.2	7.3	0.5	0.2	4.0	0.2

Con't.

| | JOHNSON POWERPLANT | | | | | | | SALIDA POWERPLANT | | | | SALIDA GAGE | | | | | | | | | | PUEBLO RESERVOIR OPERATION | | | | | | | | | |

SUMMARY SHEET

Water year	SUGAR LOAF RESERVOIR: Inflow from Pryingpan River.	Lake Fork of Arkansas River	Irrigation releases for Lake Fork lands	Fish release for Lake Fork	Release to Elbert Canal	Reservoir evaporation	Reservoir content end of Sept.30	Reservoir spills	ELBERT POWERPLANT: Halfmoon Creek 26.9 sq. mi.	Halfmoon Creek spills	Irrigation by-pass Halfmoon Creek land	Elbert Canal loss 10%	Total flow thru Elbert Power Canal	Power generated Elbert Power Plant	SNOWDEN DIVERSION: Inflow from small existing tributaries at Snowden diver.	193.8 sq. mi. Arkansas R. drainage available at Snowden diver.	Fish flow passed at Snowden diver.	Total available at Snowden River.	TWIN LAKES RESERVOIR: Twin Lakes (Independence Pass) River.	Lake Creek 106.0 sq. mi.	Total Inflow to Twin Lakes	Fish flow released for demand at Granite	Release to Granite Power Plant	Power generated at Granite Power Plant	Evaporation	Reservoir content end of Sept.30	Reservoir spills	WAPACO POWERPLANT: Spills below Granite Power Plant	Clear Creek 47.7 sq. mi.	37.4 sq. mi. above Clear Creek Canal	Total flow thru Wapaco Power Plant	Power generated at Wapaco Power Plant	WAPACO INTERCEPTION AND PRINCETON POWERPLANT: 79.9 sq. mi. above Granite Gage	28.8 sq. mi. above Wapaco interception	Fish flow by-passed at Wapaco interception	Wapaco interception to Princeton Power Plant	Canal loss 5% & interception loss	Total flow to Princeton Power Plant	Power generated at Princeton Power Plant	JOHNSON POWERPLANT: Chalk Creek 80.6 sq. mi.	Chalk Creek spills	Irrigation by-pass Chalk Creek land	Fish flow by-pass Chalk Creek	Canal loss 3% & interception loss	Total flow thru Johnson Power Plant	Power generated at Johnson Power Plant	SALIDA POW: Canal loss 2%
(1) (2)	(3)	(4)	(5) 1/	(6) 2/	(7)	(8)	(9)	(10)	(11)	(12)	(13) 4/	(14) 5/	(15)	(16)	(17)	(18)	(19) 8/	(20)	(21) 7/	(22) 8/	(23)	(24)	(25)	(26) 9/	(27) 10/	(28)	(29)	(30)	(31) 11/	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42) 12/	(43)	(44) 13/	(45)	(46)	(47)	(48)	(49) 14/	(50) 15/	(51)	(52) 17/	(53)	(54)	(55)
91	973	286	45	2.1	105.1	2.6	111.6 (100.0)	0	20.9	1.6	4.9	11.9	10.76	45.2	0	72.6	24.7	72.9	56.1	101.4	357.0	14.2	343.4	70.8	3.8	93.0 396	0	75.4	61.3	14.8	344.1	139.6	16.2	4.0	4.0	1.1	24.2	323.0	75.2	66.1	2.8	22.8	2.5	18.0	350.0	77.0	7.3
92	123.3	29.1	45	2.1	172.2	2.7	116.5	0	24.4	4.2	5.0	14.4	130.0	54.7	0	31.5	24.8	73.7	69.1	103.1	396.1	15.3	377.5	78.7	4.6	38.3 0	0	89.2	60.7	13.4	362.4	147.1	15.4	3.6	4.0	1.1	23.2	346.3	78.9	76.9	4.6	23.7	2.5	21.3	371.1	81.6	7.5
93	573.1	82.6	45	2.1	64.0	2.0	116.6	0	16.9	0.3	4.8	7.8	67.9	29.4	0	18.2	24.1	69.6	52.4	90.6	276.5	16.5	261.4	61.5	4.9	44.5 0	0	10.3	57.1	13.0	301.2	132.3	15.4	3.6	4.0	9.6	24.6	285.2	66.1	50.1	0.4	21.8	2.5	18.1	302.1	66.5	6.3
94	140.3	30.0	45	2.1	130.8	2.7	116.8	0	22.8	2.5	4.8	13.6	122.7	51.6	0	26.9	24.5	74.4	71.6	107.1	401.3	13.6	272.1	63.9	5.6	154.5 0	0	1.6	71.7	20.3	342.5	147.2	16.9	5.6	4.0	12.6	19.3	355.8	81.2	46.7	2.1	22.5	2.5	15.1	376.3	82.8	7.7
95	644.9	20.4	45	2.1	78.4	2.9	116.7	0	14.9	0.5	4.8	5.7	78.2	32.9	0	46.3	22.3	65.2	51.2	67.8	262.9	16.0	181.5	42.6	7.3	172.1 0	0	0	94.2	14.9	240.6	77.7	11.6	4.2	4.0	6.1	12.3	234.4	53.3	45.2	0.4	21.5	2.5	7.7	247.5	54.4	5.0
96	1002.7	35.9	45	2.1	126.4	2.8	117.0	0	32.0	5.3	4.9	14.8	133.4	56.1	2.3	110.6	24.7	113.8	63.9	181.7	464.8	12.6	369.2	84.3	5.5	258.3 25.6	0	192.2	57.9	16.3	270.2	117.6	13.3	4.4	4.0	15.0	24.6	278.6	63.6	43.8	1.6	23.5	2.5	14.4	300.6	64.0	6.0
97	107.6	34.2	45	2.1	134.8	2.8	117.0	0	31.0	5.4	5.0	15.5	139.5	58.6	2.5	77.0	28.8	82.2	64.0	127.8	434.5	13.4	349.6	80.0	7.8	228.7 13.5	0	134.9	64.4	16.7	348.2	141.4	16.9	4.6	4.0	15.9	30.4	332.9	74.1	62.4	4.0	22.1	2.5	13.4	349.6	76.8	7.2
98	40.3	28.3	45	2.1	169.3	3.0	117.0	0	23.3	2.8	5.0	12.3	112.5	47.3	2.5	59.8	22.2	71.8	62.5	93.4	364.4	14.8	324.5	72.1	7.8	208.3 13.4	0	115.9	70.6	18.7	344.4	141.5	15.6	5.2	4.0	14.8	24.8	337.4	77.0	57.4	3.2	22.6	2.5	22.6	352.3	77.6	7.3
99	49.2	21.5	45	2.1	141.1	2.7	117.0	0	20.7	0.6	5.0	11.8	80.0	33.6	2.0	70.0	22.5	70.5	42.4	71.2	284.3	14.5	234.3	53.7	7.4	175.4 0	0	0	50.0	17.4	343.7	147.8	14.0	4.7	4.0	7.7	18.6	352.8	80.4	58.2	0.2	22.9	2.5	11.7	373.7	84.3	7.4
00	90.7	23.6	45	2.1	104.9	2.8	117.0	0	27.0	3.8	4.9	13.9	125.5	52.8	2.0	75.0	24.7	79.5	46.6	111.9	461.5	14.0	345.0	65.0	7.5	273.4 0	0	63.9	67.3	20.4	340.8	144.4	16.6	5.5	4.0	14.8	24.2	354.4	80.8	72.3	5.3	23.1	2.5	21.3	374.5	82.4	7.7
01	20.7	0.8	45	2.1	104.9	2.8	117.0	0	20.7	0.8	5.0	12.0	107.8	42.4	1.8	74.8	22.9	74.7	4.0	14.4	334.4	14.2	258.5	46.7	7.7	254.2 0	0	3.5	76.7	13.4	346.2	149.3	13.9	5.3	4.0	1.5	23.5	331.3	75.4	76.3	1.9	22.9	2.5	16.9	353.3	77.6	7.3
1932	746	28.0	45	2.1	92.4	3.0	117.0	0	25.9	1.2	5.0	11.0	94.1	41.8	1.7	94.1	24.5	95.1	54.6	99.7	394.5	13.6	331.1	78.1	8.5	251.3 22.2	0	92.0	57.6	14.6	296.3	120.2	18.4	5.4	4.0	11.9	23.2	285.0	65.0	62.4	2.5	21.7	2.5	16.9	301.8	67.9	6.2
33	92.5	25.7	45	2.1	108.8	2.8	117.0	0	22.4	1.0	5.0	12.5	112.7	47.4	2.2	86.7	22.7	89.3	64.0	92.0	368.0	14.0	334.8	76.9	8.5	240.0 0	0	76.1	64.8	18.0	338.0	137.2	16.8	5.0	4.0	8.5	23.2	323.3	73.8	75.2	5.5	22.8	2.5	22.6	345.1	77.6	7.0
34	67.3	32.8	45	2.1	91.1	3.0	116.4	0	27.6	3.2	4.7	14.0	99.8	42.2	2.3	101.1	24.1	100.8	48.7	118.5	344.5	13.3	133.0	27.7	4.7	246.0 265	265	144.3	53.2	12.1	289.0	117.3	17.6	4.7	4.0	13.7	24.9	278.8	63.3	60.7	2.2	21.4	2.5	18.1	292.5	65.4	6.0
35	71.4	20.4	45	2.1	72.5	2.9	116.2	0	12.7	0.2	5.0	7.5	69.8	30.9	1.7	25.7	22.1	74.0	49.5	72.3	287.4	16.0	206.9	52.3	4.5	194.7 0	0	52.0	58.1	13.7	301.7	132.5	13.2	3.9	4.0	6.2	18.7	289.2	65.8	39.1	0	24.9	2.5	9.8	294.1	64.8	6.0
36	71	27.5	41	2.1	89.1	3.0	116.5	0	22.6	2.5	4.6	10.3	74.3	33.7	1.5	18.0	25.1	88.0	49.1	95.4	326.8	14.8	306.3	71.6	7.4	195.0 0	0	13.2	44.7	14.9	352.7	143.1	15.3	4.0	4.0	7.2	24.5	337.4	77.0	52.2	0.7	21.2	2.5	13.3	351.9	77.5	7.2
37	144	31.5	45	2.1	106.0	2.8	117.0	0	24.4	3.4	5.0	12.4	111.6	47.0	1.7	97.8	23.7	97.2	60.9	112.1	385.6	14.0	337.2	79.7	7.5	219.7 0	0	60.0	52.1	15.6	346.9	140.7	17.0	4.4	4.0	13.3	23.2	331.0	75.8	60.8	2.1	21.8	2.5	16.4	350.0	77.0	7.2
38	78.1	23.0	45	2.1	98.0	2.9	116.6	0	24.3	2.5	5.0	11.6	103.2	43.3	2.2	77.9	24.7	78.1	53.4	103.7	364.9	14.9	308.6	72.5	8.0	250.3 0	0	33.8	47.0	16.8	338.4	137.3	17.0	4.7	4.0	14.8	23.2	324.2	74.0	56.0	0.6	20.4	2.5	12.3	344.4	75.8	7.0
39	84.9	26.8	45	2.1	104.6	2.8	116.5	0	22.8	1.6	5.0	12.1	108.8	45.7	2.2	69.8	23.4	72.9	46.7	96.0	355.1	14.4	322.4	75.8	8.6	260.0 0	0	66.8	60.4	17.0	333.0	135.2	14.8	4.6	4.0	9.2	23.4	318.8	72.7	62.9	1.1	22.3	2.5	14.2	341.6	75.2	7.0
40	67.4	23.6	45	2.1	92.5	3.0	116.2	0	19.2	0.6	5.0	9.7	87.1	36.2	1.8	76.9	23.4	77.6	49.2	87.7	332.4	11.6	285.9	67.3	7.2	249.2 0	0	0	38.8	16.0	340.3	138.0	14.9	4.4	4.0	5.7	18.7	317.3	74.7	42.8	0	22.4	2.5	10.1	336.1	73.8	6.0
1931	30.8	11.9	3.9	2.1	33.7	3.3	115.9	0	16.1	0	4.4	3.9	38.5	15.0	2.2	51.4	24.5	64.9	25.0	38.2	145.3	16.4	240.6	56.4	7.9	128.0 0	0	0	14.4	12.0	267.0	108.4	10.1	3.3	4.0	3.7	15.6	257.1	58.6	19.9	0	19.5	2.5	7.4	272.2	59.6	5.0
32	76.8	22.3	4.1	2.1	99.4	2.9	116.5	0	18.5	1.2	4.6	11.2	100.9	42.5	2.3	74.6	25.1	76.0	57.4	77.5	317.5	14.9	312.1	73.4	6.1	110.4 0	0	0	38.7	13.7	343.5	147.5	12.4	3.5	4.0	7.9	24.4	347.0	79.1	54.6	0	19.9	2.5	11.0	360.2	79.3	7.4
33	634.2	22.8	4.1	2.1	77.3	3.0	116.2	0	17.9	2.5	4.6	8.7	79.4	33.5	5.2	70.4	27.9	69.7	47.2	75.3	272.1	15.2	255.9	60.0	6.1	105.3 0	0	0	31.8	11.7	279.6	121.5	10.1	3.2	4.0	5.4	15.6	262.2	66.7	39.8	0.7	18.2	2.5	10.4	300.2	66.0	6.2
1934	248.1	10.1	4.0	2.1	44.8	4.1	94.1	0	9.6	0	4.4	5.0	46.0	19.4	4.6	57.5	22.2	55.4	26.1	34.9	162.4	17.2	238.9	56.2	4.5	7.1 0	0	0	18.6	12.5	274.0	109.8	12.3	3.5	4.0	7.2	13.7	243.5	60.0	26.3	0	16.8	2.5	8.2	262.3	57.8	5.3
35	62.9	23.4	4.5	2.1	100.2	2.3	74.3	0	18.9	2.2	4.7	11.3	100.9	42.4	6.1	62.7	27.2	71.4	47.5	77.3	297.1	15.5	214.2	49.8	4.4	72.9 0	0	0.8	47.4	12.6	276.6	109.8	9.8	3.6	4.0	8.1	14.6	264.3	60.2	54.4	3.6	19.3	2.5	15.8	277.5	61.1	5.8
36	74.9	27.1	4.5	2.1	52.8	3.3	102.9	0	22.3	1.0	5.0	6.8	62.3	26.2	8.0	106.9	27.7	74.4	59.0	96.5	316.2	12.6	232.3	71.2	5.3	38.0 3.4		82.4	54.0	16.1	320.0	139.9	18.9	4.2	4.0	25.6	20.5	312.1	74.2	63.1	1.4	22.2	2.5	14.6	345.5	76.0	7.1
37	52.7	14.6	4.2	2.1	74.6	2.8	99.5	0	12.8	1.8	4.7	8.3	74.3	31.1	4.5	64.3	28.2	69.9	40.0	51.4	231.6	15.0	225.9	53.1	4.1	246.0 0	0	0	30.5	14.2	270.4	109.7	12.9	3.7	4.0	6.0	12.7	262.7	57.9	31.2	0	17.8	2.5	9.2	270.5	57.8	5.5
38	89.9	29.5	4.5	2.1	92.5	2.8	117.0	0	23.8	4.1	5.0	10.8	94.9	40.5	7.5	78.3	33.2	70.9	58.8	101.9	347.5	13.6	308.7	72.3	4.7	457.0 0	0	49.1	37.4	12.8	316.2	126.3	12.7	3.2	4.0	4.7	15.4	299.9	67.3	46.5	1.0	20.2	2.5	13.2	309.5	67.9	6.2
39	50.7	18.9	4.1	2.1	61.4	3.0	116.0	0	18.5	0.1	4.4	7.2	65.2	27.4	4.8	84.7	29.8	78.4	44.7	63.3	257.6	14.4	240.5	62.4	4.3	19.7 0	0	1.6	25.6	13.7	272.2	120.8	14.0	3.7	4.0	15.1	16.3	256.0	62.5	34.7	0	18.9	2.5	10.1	292.2	65.7	6.2
40	56.6	11.9	4.0	2.1	54.0	2.6	70.7	0	12.1	0	4.4	4.8	50.7	23.9	3.5	54.4	21.7	55.3	30.3	40.2	207.2	17.1	185.2	43.6	4.1	13.7 0	0	0	12.3	9.9	224.4	84.3	9.8	2.8	4.0	3.6	10.4	200.6	45.8	19.9	0	15.6	2.5	6.7	176.2	43.2	4.0
41	66.6	21.8	4.4	2.1	72.2	2.5	72.9	0	18.0	1.0	4.7	8.4	74.1	32.1	4.4	74.0	25.6	78.4	46.5	75.6	276.6	15.0	241.7	58.1	4.9	114.9 0	0	0	43.1	12.6	274.4	88.3	12.7	3.7	4.0	9.0	11.4	250.9	49.1	52.3	1.7	19.3	2.5	7.3	236.5	52.3	4.2
1942	77.7	26.7	4.3	2.1	68.8	2.9	116.5	0	20.2	2.2	4.5	5.9	83.4	22.4	2.1	74.8	24.2	73.3	51.6	83.6	261.7	15.5	174.2	40.1	4.5	180.6 0	0	0	57.0	17.3	250.5	101.7	13.4	4.1	4.0	9.9	13.1	247.3	56.3	45.8	3.4	23.0	2.5	6.7	225.5	60.6	5.6
43	78.1	26.5	4.4	2.1	80.4	2.9	116.3	0	22.4	1.7	4.7	10.5	95.8	40.2	4.2	84.7	24.5	82.9	54.8	72.4	332.5	14.6	261.6	61.3	3.8	223.5 0	0	27.2	43.4	14.7	272.5	118.8	14.7	4.0	4.0	9.8	15.8	256.5	65.3	49.7	0.3	22.2	2.5	10.3	300.9	64.1	6.1
44	67.3	19.8	3.5	2.1	78.9	2.9	116.0	0	16.2	0.8	3.9	9.0	81.4	34.3	2.0	76.5	23.0	69.8	49.0	64.0	248.2	16.5	253.7	59.6	3.1	219.4 0	0	0	38.5	14.2	306.4	124.9	12.4	3.8	4.0	7.7	15.7	292.4	68.1	47.5	0.5	18.2	2.5	11.7	313.0	68.8	6.3
1911-44 Average	742	247	4.3	2.1	89.1	2.9		0	20.6	1.8	4.8	10.3	92.9	39.0	2.7	84.1	25.3	83.8	52.5	86.7	315.9	14.6	286.3	66.8	6.6		30	38.9	47.5	15.3	310.2	125.9	14.4	4.2	4.0	10.5	20.4	300.3	68.5	54.4	2.3	20.9	2.5	13.8	315.2	69.3	6.4
1921-40 Average	577	192	4.2	2.1	72.3	3.0		0	15.8	1.1	4.6	8.2	74.2	31.2	5.2	72.3	26.7	71.0	43.8	66.2	255.3	15.2	257.6	60.6	5.1	-	0.3	All	31.4	12.8	287.7	116.8	12.5	3.6	4.0	10.0	16.8	280.9	64.0	48.9	0.7	18.5	2.5	10.8	287.3	63.2	5.9

1/ 15 c.f.s. or natural flow.
2/ 8 c.f.s. or natural flow.
3/ Active capacity 117,000 ac.-ft.
4/ 100 c.f.s. diversion canal to Elbert Canal.
5/ 16 c.f.s. irrigation decree.
6/ Fremont Pass, Hurts, Ewing and Columbine Ditches.
7/ 30 c.f.s. or natural flow plus interception loss.
8/ Cols. 5 / 6 / 10 / 13 / 14 / 15 / 19 / 20 - 21.
9/ Cols. 18 / 22 / 24 / 25.
10/ 66 c.f.s. demand at Granite
Cols. 21 / 27 / 28 * 6.0 each month.
11/ 260,000 ac.-ft. active capacity.
12/ Cols. 21 / 27 / 29 / 40 - 41.
13/ Cols. 36 / 42 - 43.
14/ 878 c.f.s. diversion canal.
15/ 67 c.f.s. irrigation decree or natural flow.
16/ 8 c.f.s. during winter - included in Col. 49 during irrigation season.
17/ Col. 44 / 47 = 48 - 49 - 50 - 51.
18/ Col. 52 - 53.
19/ Col. 41 / 50.
20/ Cols. 33 / 43 / 51 / 55.
21/ Incl

SHEET

| | JOHNSON POWERPLANT | | | | | | | SALIDA POWERPLANT | | | SALIDA GAGE | | | | | | | | | | POEBLO RESERVOIR OPERATION | | | | | | | | | |

Column 68: Estimated transportation loss is 11 percent of the difference between column 72 and the sum of columns 66 and 69.

Column 69: Gain between Salida and Pueblo was computed by subtracting the historical recorded runoff at Salida from the historical flow at Pueblo Reservoir, column 72 and increased by the past diversions of Bessemer ditch which are shown under column 70.

Column 71: Project operation flow to Pueblo Reservoir is obtained by adding or subtracting the gain, column 69, to the project operation flow at Salida, column 66 less estimated transportation loss shown in column 68.

Column 72: Historic flow of the Arkansas River at Pueblo Reservoir increased by past diversions of Bessemer ditch.

Column 73: Historic flow released from Pueblo Reservoir is the same as the flow shown in column 72 depleted by flow shown in column 78, except for the winter months November through March when the only releases made were the historic pumped quantities for Pueblo municipal supply and any other nonstorable flows. The balance of winter flows were held in storage for release during the irrigation season.

Column 74: Winter release of stored Arkansas River water is made in accordance with headgate shortage (column 89) after being charged with the preceding year's evaporation loss of Pueblo Reservoir.

Column 75: Project supplemental irrigation water was released when possible in accordance with the shortage shown in column 89, after being reduced by the flow in column 74.

Column 76: Independence pass water releases were computed by years before monthly breakdowns were made and are explained in another section of this appendix.

Column 77: Total releases through Pueblo powerplant include all depletions except those in columns 78, 79 and 81 up to a maximum of 2,000 cubic feet per second.

Column 78: Flows shown are the same as those in column 70 with the exception of the winter months November through March.

Column 79: Valley and municipal releases do not go through the powerplant. They are explained in another section of this appendix.

Column 80: Total power generated from releases shown in column 77.

Column 81: Reservoir surface evaporation for 1 month.

Column 82: Content of Pueblo Reservoir at end of month.

Column 83: Project spills of floodwater occur when necessary to evacuate the flood pool by April 15 each year.

Column 84: Stored winter Arkansas River water spilled when necessary to evacuate the flood pool by April 15 each year.

Column 86: Total power generated from all powerplants. Excessive power generation in certain months was caused by large uncontrolled intermediate flows and from reservoirs releases made to avoid spills and to meet irrigation requirements below Pueblo.

Column 87: Gross capture of Arkansas River flood flows for conversion to beneficial use.

Column 89: Estimated irrigation headgate shortage for 306,000 acres below Pueblo to be supplied from project waters as far as possible consistent with project operation criteria.

EXHIBIT C

Letter from the Bessemer Irrigating Ditch Co., Pueblo, Colo., dated January 5, 1954, to Mr. Ben. F. Powell, area engineer, Bureau of Reclamation, Pueblo, Colo.

THE BESSEMER IRRIGATING DITCH CO.,
Pueblo, Colo., January 5, 1954.

Mr. BEN. F. POWELL,
Engineer, United States Bureau of Reclamation,
Pueblo, Colo.

DEAR MR. POWELL: I am instructed by the board of directors to advise you that this company is willing to negotiate for reservoir water from the Fryingpan-Arkansas diversion system at the rate of $5.40 per acre-foot.

Also we are willing to negotiate for winter-stored reservoir water at the rate of $2.25 per acre-foot.

Very truly yours,

A. N. DALLIMORE, *Secretary-Treasurer.*

EXHIBIT D

Letter from the Catlin Canal Co., Manzanola, Colo., dated December 16, 1953, to Mr. Ben. F. Powell, area engineer, Bureau of Reclamation, Pueblo, Colo.

CATLIN CANAL CO.,
Manzanola, Colo., December 16, 1953.

Mr. BEN. F. POWELL,
Area Engineer, Bureau of Reclamation,
Pueblo, Colo.

DEAR MR. POWELL: At a special meeting of the board of directors of the Catlin Canal Co., held on December 16, 1953, I was instructed by the board to write to you regarding the purchase of storage water from the Bureau of Reclamation.

The Catlin Canal Co. will be willing to negotiate with the Bureau of Reclamation for the purchase of storage water at $5.40 an acre-foot and would be willing to consider the purchase of winter storage water, subject to the terms and conditions of the Bureau.

Very truly yours,

ALBERT R. STOVER, *Secretary-Treasurer.*

EXHIBIT E

Letter from the Twin Lakes Reservoir & Canal Co., Ordway, Colo., dated January 5, 1954, to the Water Development Association of Southeastern Colorado, Pueblo, Colo.

THE TWIN LAKES RESERVOIR & CANAL CO.,
Ordway, Colo., January 5, 1954.

The WATER DEVELOPMENT ASSOCIATION OF SOUTHEASTERN COLORADO,
Pueblo, Colo.

DEAR SIRS: The Twin Lakes Reservoir & Canal Co. is willing to consider negotiations at the proper time with the conservancy district, which it is proposed is to be formed at some date in the future in the Arkansas Valley, for the purchase of water which may become available from the Fryingpan-Arkansas project. Our company understands that such negotiations are to be along the lines and subject to the rates and conditions for the use of such water as may be available, as are set forth in the pamphlet, entitled "Hearings Before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs, House of Representatives, 83d Congress, 1st session, on H. R. 236," dated June 8, 9, and 10, 1953, and particularly the matters relating to revenues found on page 113 of said pamphlet.

Yours very truly,

HERBERT SCHROEDER, *President.*

EXHIBIT F

Letter from the Fort Lyon Canal Co., Las Animas, Colo., dated January 7, 1954, to Mr. Ben F. Powell, area engineer, Bureau of Reclamation, Pueblo, Colo.

THE FORT LYON CANAL CO.,
Las Animas, Colo., January 7, 1954.

Mr. BEN F. POWELL,
Area Engineer, Bureau of Reclamation,
Pueblo, Colo.

DEAR Mr. POWELL: As you know, the Fort Lyon Canal Co. has at present, an inadequate water supply for the 94,000 acres which are irrigated by its system. The company is tremendously interested in obtaining additional water and for that reason has taken an active part in promoting the Fryingpan-Arkansas project.

An additional water supply would be of great value to the company and the company would certainly be willing to negotiate with the Bureau of Reclamation for the purchase of storage water ot $5.40 per acre-foot and in addition would

be willing to consider the possibility of the purchase of winter storage water subject to the terms and conditions imposed by the Bureau of Reclamation.

Very truly yours,

RAY MCGRATH, *President.*

EXHIBIT G

Letter from Mr. H. H. Christy, Director, Water Development Association of Southeastern Colorado to Mr. Ben F. Powell, Area Engineer, Bureau of Reclamation, Pueblo, Colo., dated December 18, 1953

DECEMBER 18, 1953.

Mr. BEN F. POWELL,
Area Engineer, Bureau of Reclamation,
Federal Building, Pueblo, Colo.

DEAR BEN: Referring to your inquiry relative to the Fryingpan-Arkansas and numerous questions that have been raised, I will attempt to answer the following question, "What assurance do you have from authoritative sources that: The present holders of rights to winter flow will agree to a conversion of such rights to storage and make payment for this water at the rate proposed?"

I submit that it is very difficult to obtain a firm commitment from the numerous water users, in answer to this question, in advance of formal authorization of the Fryingpan-Arkansas project and in advance of definite and complete knowledge as to the specific wording in the repayment contract to be required by the Secretary of the Interior. Such a statement would, in effect, be the same as signing a blank check.

Referring to the above paragraph, someone may say, "Well, the project sponsors are trying to borrow money from the Government." I submit that the Government's security, in my opinion, is based on an obligation entered into by the water users in the Arkansas Valley with the water users on the Colorado River drainage and contained in a stipulation by the Colorado Water Conservation Board when that board approved the project. That is, "Prior to commencement of project construction, the following conditions precedent must be satisfied. (*a*) There will be executed a payment contract between the Eastern Colorado Conservancy District and the United States in which will be incorporated the approved operating principles." If the Government has a signed repayment contract before the project is constructed, the necessity of the question I am endeavoring to answer has been eliminated. The above quotation appears in line 8, top of page 160, House Document 187, 83d Congress, 1st session.

We do have the following information, however, which I beleive is an authoritative answer as to willingness and policy of the water users.

(1) In the official records of the Colorado Water Conservation Board, covering meetings of the Fryingpan-Arkansas Policy and Review Committee, is a statement, "that this entire group (major ditch companies on the Arkansas River) expresses a willingness and a desire to give full consideration to the proposal that the ditch companies, between the Pueblo Reservoir and the John Martin Reservoir, enter into agreements whereby the historical winter diversions (November 1 to April 1) of the ditches in this area be held in the Pueblo Reservoir subject to call the following irrigation season, the water to be either earmarked, or divided proportionately, based on the interest of the various ditches, some winter diversions in the intervening area to be continued on account of the water passing Pueblo and the return flow, all of which creates surface flow below the Pueblo Reservoir site." Each of the major ditch companies have submitted written statements confirming the above.

(2) Most certainly any winter reregulation that will make water available during the growing season produces benefits exactly similar in value to the supplemental water supply being developed from western Colorado. The farmers have testified, based on extensive research and study, that they can well afford to pay $5.40 per acre-foot for supplemental water. The price for reregulated water (Arkansas River water), included in the present repayment schedule, is less than $5.40 on account of the vested right of the water users to this water and represents a service charge, rather than a project price per acre-foot.

(3) Further evidence as to the value of regulation of winter flows is the history of the water users on the Arkansas River below John Martin Reservoir. At the time the John Martin project was up for consideration and for a period following the completion, there were numerous discussions and arguments relative to the

merit of deferment of winter irrigation, as compared with direct application of water during the growing season. The operation of the John Martin Reservoir has definitely indicated to the water users the value of a supplemental water supply applied during the growing season. In other words, the people below the John Martin Reservoir have become educated and are no longer arguing the merits of winter flow, as against water applied during the growing season.

I believe this will serve to answer your inquiry.

Very truly yours,

H. H. CHRISTY.

EXHIBIT H

Excerpts from minutes of meetings of representatives of the following irrigation groups: Catlin, Highline, Rocky Ford, Holbrook and Bessemer Ditch & Canal Cos., Rocky Ford, Colo., on February 22, 1949; Fort Lyon Canal Co., Las Animas, Colo., on March 3, 1949; Amity Canal Co., Lamar, Colo., on March 1, 1949; Twin Lakes Reservoir & Canal Co., Ordway, Colo., on March 2, 1949.

MOTION MADE BY CATLIN, HIGHLINE, ROCKY FORD, HOLBROOK AND BESSEMER DITCH & CANAL COS., ON FEBRUARY 22, 1949, AT A MEETING HELD IN ROCKY FORD, COLO.

(This motion was carried by unanimous vote of those present)

"That this entire group express a willingness and a desire to give full consideration to the proposal that the ditch companies between the Peublo Reservoir and the John Martin Reservoir enter into agreements whereby the historical winter diversions (November 1 to April 1) of the ditches in this area be held in the Pueblo Reservoir subject to call the following irrigation season, the water to be either earmarked or divided proportionately based on the interests of the various ditches, some winter diversions in the intervening area to be continued on account of the water passing Pueblo and the return flow, all of which creates surface flow below the Pueblo Reservoir site."

MOTION MADE BY FORT LYON CANAL CO., ON MARCH 3, 1949, AT A MEETING HELD IN LAS ANIMAS, COLO.

(This motion was seconded and carried unanimously)

"It was moved that this company express a willingness and a desire to give full consideration to the proposal that the ditch companies between the Pueblo Reservoir and the John Martin Reservoir enter into agreements whereby the historical winter diversions for direct use on the land of the ditches in this area be held in the Pueblo Reservoir subject to call the following irrigation season, the water to be distributed and divided as may be agreed upon by the various interested ditches, some winter diversions for direct use on the land in the intervening area to be continued on account of the water passing Pueblo and the return flow."

PROPOSAL MADE BY AMITY CANAL GROUP ON MARCH 1, 1949, AT A MEETING HELD IN LAMAR, COLO.

(This proposal was discussed and agreed to by those present, however, no motion was made nor was any vote taken. It was indicated by those present that such a proposal was agreeable)

"That this entire group express a willingness to give hydroelectric power first priority on all imported water developed by the first stage Gunnison-Arkansas project, this in order to build up an operating pool during early stages of the project, and also to permit the generation of maximum amount of firm power."

MOTION MADE BY TWIN LAKES RESERVOIR & CANAL CO. ON MARCH 2, 1949, AT A MEETING HELD IN ORDWAY, COLO.

(This motion was seconded and carried unanimously.)

"That the Twin Lakes Reservoir & Canal Co. expresses a willingness to give full consideration, at the proper time, to the proposition that the appropriators

of water from the Arkansas River between the proposed Pueblo Reservoir and the John Martin Reservoir enter into agreements whereby the historical winter diversions (that is from November 1 of each year to the following April 1 of the succeeding year) of the appropriators in this area, be held in the Pueblo Reservoir subject to call during the following irrigation season, the water so stored to be either earmarked or divided proportionately based on the interests of the various appropriators, it being understood in this connection that some winter diversions in said area shall be continued because of the water normally passing Pueblo and the return flow, all of which creates surface flow below the Pueblo Reservoir site."

Mr. ASPINALL. The gentleman may proceed now with his questioning.

Mr. SAYLOR. Mr. Tomlinson, the first question I have to ask is this: Who owns Sugar Loaf Reservoir?

Mr. TOMLINSON. I understand the Colorado Fuel & Iron Co. owns the existing Sugar Loaf Reservoir.

Mr. SAYLOR. What arrangements have been made with the Colorado Fuel & Iron Co. for the acquisition of the Sugar Loaf Reservoir?

Mr. TOMLINSON. The only arrangements which I know of have been of an informal nature, but Mr. Christy, who is their superintendent of water and power, has been actively participating in this project and he had indicated to me personnally, as well as to this committee, there will be no difficulty whatsoever in coming in on this project with a satisfactory transfer, or whatever would have to be required.

Mr. SAYLOR. Is Mr. Christy the president, vice president, or an officer of the Colorado Fuel & Iron Co.?

Mr. TOMLINSON. He is the superintendent of water and power of that company.

Mr. SAYLOR. Is he a member of the board of directors of that company?

Mr. TOMLINSON. I think he is not, sir.

Mr. SAYLOR. Then you have come before this committee and are requesting us to authorize a project which will include, among other things, the acquisition of a reservoir owned by a corporation. You have had no communication with the president, vice president, secretary, treasurer, or any member of the board of directors, stockholders of that company; is that correct?

Mr. TOMLINSON. We have not had any directly. He has stated that he has consulted with the board, and he anticipates no trouble whatsoever.

Mr. SAYLOR. But the Bureau of Reclamation has had no contacts with any of the people that I have referred to?

Mr. TOMLINSON. As far as I know, they have not, sir. Of course, we could condemn the right-of-way——

Mr. SAYLOR. I am not arguing about that. I realize you can condemn it, and it is always a right which the Government has.

Dr. MILLER. Will the gentleman yield?

Mr. SAYLOR. Yes.

Dr. MILLER. Does the Colorado Fuel & Iron own any large steel mill near Pueblo from which they would benefit by having a larger reservoir at Sugar Loaf?

Mr. TOMLINSON. I made inquiries when I was out there among some of the Bureau people and others. It is true they do own a large mill and other industrial properties. As far as I know, they have ample

water supply and ample financing power to increase their water supply.

Dr. MILLER. And Sugar Loaf is their water supply?

Mr. TOMLINSON. Sugar Loaf is their water supply. They have expressed a willingness, of course, to come into the conservancy district, and they would pay quite a few thousand dollars a year by virtue of the ad valorem assessments which they would pay as part of Pueblo County.

Mr. SAYLOR. There is nothing in the plans which you have submitted to either the Senate or the House on this project that indicates that Colorado Fuel & Iron will use any other than that to which they now are entitled. Is that not correct?

Mr. TOMLINSON. That is right. They will use no project water. There is a possibility we may provide facilities when we increase their present reservoir to store for them some of their own water on a service-charge basis.

Mr. SAYLOR. The next item you have referred to is Twin Lakes Reservoir. Who owns Twin Lakes Reservoir?

Mr. TOMLINSON. The farmers of an irrigation district own the existing Twin Lakes Reservoir.

Mr. SAYLOR. Are you familiar with the financing which took place on that reservoir?

Mr. TOMLINSON. I am not personally; no, sir.

Mr. SAYLOR. Mr. Powell, are you familiar with it?

Mr. POWELL. I can take a stab at it.

Mr. SAYLOR. Will you give us for the benefit of the record what you know about it?

Mr. POWELL. As I understand it, and I am fairly familiar with it, I have lived in the valley 60 years—Twin Lakes borrowed of the RFC the money to make the Twin Lakes diversion. The farmers borrowed the money, and they paid off part of their loan. And at the time the RFC was liquidated their loan was sold to a brokerage house and the lien is still against the farmers and against the reservoir. It is specifically against the reservoir.

Mr. SAYLOR. Are you familiar with the fact that after the RFC made its original loan the Twin Lakes Co. could not pay the RFC the amount that was due on its annual payment? Are you familiar with that fact?

Mr. POWELL. Not entirely.

Mr. SAYLOR. The information that has been furnished to me by the office of the Reconstruction Finance Corporation is to the effect that this organization was unable to make certain repayments, and it refinanced, and at the time it refinanced it acquired more money from the Federal Government and put up in addition 35,000 shares of stock which were owned by the RFC. The RFC sold at the time it was liquidated the obligations of Twin Lakes, including 35,000 shares of stock, to a finance house in the city of Denver—Boettcher & Co. The obligations of the Twin Lakes Development Co. bore 4 percent interest. On that obligation the Federal Government, the taxpayers, you and I and everyone else, suffered a loss, quite a sizable loss in the return.

In other words, the Reconstruction Finance Corporation on its best bid did not get near the amount of money which they had placed in this Twin Lakes Development Corp.

Now, in view of that fact, I want to know what arrangements have been made with the owners of the 35,000 shares of stock of the Twin Lakes Co., Mr. Powell——

Mr. HOSMER. Will the gentleman yield?

Mr. SAYLOR. To pay them for Twin Lakes. Do you know of any arrangements that have been made with them?

Mr. POWELL. I have carried on, Mr. Saylor, discussions from time to time with the Twin Lakes board over a period of about 10 years. They have expressed the willingness to cooperate in the project and in all of these reservoir projects in which we come in contact, it is the understanding that they will maintain their present situation, and in maintaining their present situation, it is my opinion that the Federal Government would be responsible for the cost of enlarging the reservoir, but the present capacity and the present rights to the Twin Lakes Reservoir and canal company would be intact and is something aside and apart from the construction of the reservoir. It would not necessarily entail that the project would take over the indebtedness of the reservoir at all.

Mr. SAYLOR. The next question I have is this: Can you tell me the relative height or elevation of the canal which you propose to build in the Fryingpan-Arkansas project as compared with the canal that was originally planned in the Colorado-Big Thompson project?

Mr. POWELL. Well, I will go from memory.

Mr. SAYLOR. As far as altitude is concerned.

Mr. POWELL. About 9,000 feet, Mr. Lindseth says. Mr. Lindseth is more familiar with the Colorado-Big Thompson than I am. And one of our canals, a short canal, is around 9,500, and the major portion of our canal system is under 6,500.

Mr. SAYLOR. How long have you three gentleman worked for the Bureau of Reclamation? I would like to have each one of you answer.

Mr. TOMLINSON. I have worked for the Bureau of Reclamation since right after World War II in 1946.

Mr. POWELL. I came to the Bureau in 1941.

Mr. LINDSETH. I came in January 1934.

Mr. SAYLOR. In 1948, the Appropriations Committee of Congress was greatly concerned about the increased cost of the Colorado-Big Thompson, and they called upon the Bureau of Reclamation to give an explanation as to why the cost of that project had pyramided in such fashion. If you will refer to the third supplemental appropriation hearings in 1948, you will find that the Bureau of Reclamation went into great detail in explaining that at the elevation at which the canals in the Colorado-Big Thompson were built they found it was absolutely impossible to use open canals, and that therefore it became necessary to cover those canals, to use tunnels, and that for that reason alone they accounted for 100 percent increase in the cost of the Colorado-Big Thompson.

In view of the fact that the Bureau of Reclamation is already on record and having explained the increased costs in the Colorado-Big Thompson, what assurance can you give this committee that on a project which has canals, some higher, some a little lower, but at substantially the same elevation of the Colorado-Big Thompson, that you will not be required to come here and tell us that these canals have to be covered.

Mr. POWELL. Mr. Saylor, as an engineer with probably 40 years of experience in irrigation canals, I really should have a little experience. But aside from that, from a scientific standpoint, these two cases are entirely different.

The Colorado-Big Thompson project would have taken for the side hill canals water from the river, from the Big Thompson River. The water in the river approaches 32 degrees. Now water coming out of these reservoirs in the Fryingpan-Arkansas will be at maximum density, 39 degrees. It not only has 144 British thermal units, heat units, to overcome the freeze, but it has 7 degrees of super heat. Now a canal or any body of water—this is technical information probably—

Mr. SAYLOR. Go right ahead, sir. I do not care whether it is technical or not. I will not understand it, but I will give it to some engineers that do.

Mr. POWELL. All right, sir.

Any surface of water exposed to the air will lose heat at the rate of 2 B. t. u.'s per square foot per degree difference in temperature per hour. The average worst case of this canal is 30 feet wide. The temperature difference between freezing and 30 below zero is about 60 degrees. And with the wind at 10 miles an hour you lose 3.75 B. t. u.'s. You add those British thermal units together and you get 5.75. We will use 6 to make it easy. You multiply that by 60 degrees. You multiply by the width of the canal and you get something over 9,000. That is on top of the line. Now underneath the line you have got the weight of the water in that canal. There is 150 cubic feet of water in the sample canal, and it weighs a little over 60 pound per foot. You divide that 9,000 into the other 9,000 and you come out with 1 B. t. u. per hour, and the canal will run about 20 hours. So out of the 150 B. t. u.'s of heat by scientific approach, mathematical approach, you have lost something over 20 B. t. u.'s, and you still have left some 130 British thermal units.

You cannot figure that canal will freeze, and from my experience with that kind of work and my observation of the Arkansas River that runs alongside where we propose the canal does not freeze in that 60 miles except at very rare intervals. We do not have much mush ice. We do not have these serious conditions of canal jamming until we get down out of the mountains and out on the prairie, and then the water has been exposed to the air so long, so long that this latent heat is gone out of it, this heat of fusion that has to be taken out before water freezes is gone, and then it will do just like that when you hit something that will disturb it. There is when you have your jam in your canal.

That is my approach to it.

Mr. HOSMER. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. HOSMER. Is it your engineering judgment from what you have said that these canals will not freeze at any time?

Mr. POWELL. It has always been my approach that these canals would not freeze. Some people state if they do freeze then they will still operate. That is also true. If you discount everything I have said and say these canals will freeze, that is true. I operated the Fort Lyon Canal one year when the temperature reached 27 below zero.

Mr. HOSMER. Do you know a man by the name of J. C. Stevens?

Mr. POWELL. I do.

Mr. HOSMER. Who is he?

Mr. POWELL. I do not know him. I am sorry. I have seen his name in literature. I will have to correct that.

Mr. HOSMER. Who or what was Mr. J. C. Stevens?

Mr. POWELL. I cannot remember.

Mr. HOSMER. Was he an engineer?

Mr. POWELL. I believe he was the consultant engineer at Portland.

Mr. HOSMER. Maybe one of the others knows.

Mr. TOMLINSON. I think he was a consulting engineer in the Northwest. Portland, I believe it is.

Mr. HOSMER. Are you familiar with this document that was submitted to Mr. Saylor last year?

Mr. POWELL. Yes, sir.

Mr. HOSMER. Who prepared that document?

Mr. POWELL. Prepared in my office, I think, Mr. Hosmer.

Mr. HOSMER. In your office that was prepared. You have just testified that these canals are not going to freeze under ice conditions but flow freely. Is that right?

Mr. POWELL. Yes, sir. That statement says if they do freeze, then they will operate better.

Mr. HOSMER. And that statement also says, and I quote: "The project power system has been planned and facilities provided for maintenance of a permanent ice cover during winter months."

That is found on page 8 of the monograph. When this monograph was prepared in your office and states it is going to be operated under an ice cover, how can you come here and say today you are going to operate free-flowing canals?

Mr. POWELL. As I stated, Mr. Hosmer, you can discount everything I said and still it will operate.

Mr. HOSMER. I think we have pretty good reason to if you cannot resolve this conflict between what your office has written and what you have said.

Mr. CHENOWETH. Will the gentleman yield?

Mr. HOSMER. I would like to have the gentleman explain to us if he can the conflict in his testimony. If his office is doing the engineering work and does not know what they are doing, this committee has no business in proceeding further with these hearings until such time as we can get some accurate information.

Mr. CHENOWETH. I would like to ask one simple question that may clarify it.

Mr. HOSMER. Perhaps you can. I will yield.

Mr. ASPINALL. Wait a minute. The gentleman from Pennsylvania has the time.

Mr. HOSMER. I cannot yield.

See if you can climb up out of your difficulty now.

Dr. MILLER. Will the gentleman yield to me?

Mr. SAYLOR. I would like to get an answer.

Dr. MILLER. I was going to say I see no conflict in the statement just read and——

Mr. HOSMER. I have the time.

Mr. POWELL. I will go back to what I said on my own, Mr. Hosmer. I said that these are the scientific facts, but in order to be sure I further state that if I am entirely wrong—and I am not wrong—that this other approach still is right.

Mr. HOSMER. Why did you plan as of January 1954 a system, and it will be an extensive one, to operate under a permanent ice cover, and as of today you come and tell us you have not planned it in such way, shape, or form whatsoever and it is going to operate as a free-flowing open canal system?

Mr. POWELL. There is no difference in the plans, Mr. Hosmer, regardless of how you operate. There is no difference in the plan.

Mr. HOSMER. Under what plan are you going to operate?

Mr. POWELL. We are going to operate as an open canal taking water from the reservoirs and conducting it to the powerplants.

Mr. HOSMER. From altitudes of 9,000 feet down?

Mr. POWELL. That is right.

Mr. HOSMER. To what?

Mr. POWELL. 7,300.

Mr. HOSMER. 7,300, and a series of canals here, each one interdependent upon the other.

Mr. POWELL. No, sir; that is not true, sir.

Mr. HALEY. Will the gentleman yield?

Mr. SAYLOR. I yield to the gentleman from Florida.

Mr. HALEY. I would like to direct a question to the gentleman from California.

Mr. ASPINALL. The gentleman from California is not necessarily testifying in this matter. The witness is.

Mr. HALEY. I will make this statement then: I would like to know, if I possibly can, when this survey was prepared, in whose office and under whose responsibility, if out of the office of the man now testifying and if he or someone under him signed the report.

Mr. ASPINALL. Let the Chair get this straight. Are you referring now to the questions and answers which Mr. Saylor has put in the record before you came in or are you referring to the survey and study on the whole report?

Mr. HALEY. I am referring to the proposition that the gentleman from California has just brought up a few minutes ago, in which he comments about this survey. I want to find out who made the survey, when it was made, and out of whose office.

Mr. ASPINALL. The question can be properly directed to Mr. Lindseth.

Mr. LINDSETH. Mr. Hosmer, in going back to your question of what apparently appears to be a conflict in design, it is not a conflict. It came about this way: The preliminary plans were worked out in the area office by Mr. Powell. When they were done they were brought in for review by the region by the Chief Engineer's office in Denver. A board was formed of the various experts in the Chief Engineer's office to review the plan, the facilities, the cost estimates, the geology, the location of canals, all the various aspects of the plan.

One of the things that they wrestled around for a long time was the problem of winter operations. From all the experience that the board could find in operating other Bureau of Reclamation canals, from operating similar canals by other organizations, from scientific data that had been worked out by other engineers, they came to the conclusion that there is a very, very small possibility of formation of ice that would cause an operational problem. They further came to the conclusions, however, that should for a couple of hours out of a winter ice form on the canals that the canal could operate with an ice

cover without suffering damage to the operation that would jeopardize the power operations.

Mr. HOSMER. Wait a minute now. You say you think you could operate if frozen for a couple of months?

Mr. LINDSETH. That was their finding, yes.

Mr. HOSMER. Now that study and analysis was made in the Denver office of the Bureau?

Mr. LINDSETH. Yes.

Mr. HOSMER. You have been with the Bureau since the 1930's; is that right?

Mr. LINDSETH. Yes, sir. That review was made in the Denver office, the plans in the Pueblo office.

Mr. HOSMER. Have you been in the Denver office?

Mr. LINDSETH. I was in the Denver office in 1934; yes.

Mr. HOSMER. Were you there at the time the Big Thompson project was under analysis?

Mr. LINDSETH. I was there part of that time; yes, sir.

Mr. HOSMER. Are you familiar—do you know a man or know of a man by the name of Royce J. Tipton?

Mr. LINDSETH. Yes, I know him very well.

Mr. HOSMER. Who is he?

Mr. LINDSETH. He is a consulting engineer in Denver.

Mr. HOSMER. Is he a man of staunch reputation?

Mr. LINDSETH. He is.

Mr. HOSMER. Is he familiar with the Big Thompson project planning and so forth?

Mr. LINDSETH. Yes, he is familiar with it.

Mr. HOSMER. I am going to refer you to the hearings of the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs of the United States Senate of the 83d Congress on S. 964, which is the Fryingpan-Arkansas project, and in testimony before that committee on page 218 of the record we find this statement: "The original plan contemplated"——

Mr. LINDSETH. You are referring to——

Mr. HOSMER. Referring to the Big Thompson.

> The original plan contemplated the carrying of water on the east slope through open canals, through a series of powerplants. It was finally realized that no firm energy could be derived from a project built in that fashion. No firm power would be available in the winter time.

He goes on and explains that this thing was 1 of 2 factors in the increasing cost of the Colorado-Big Thompson. One was a raise in the building costs, and the other was the fact that Bureau in Denver had originally made this error. It realized they could not build this thing with open canals and it had to turn around and use the closed conduit system and tunnels and so forth.

As I understand the Colorado-Big Thompson, it is on the east slope primarily for these purposes as the Fryingpan-Arkansas location which we are talking about. Its maximum altitude is 8,500 feet whereas the maximum altitude in this Fryingpan-Arkansas is 9,000 feet.

Mr. SAYLOR. 9,500.

Mr. HOSMER. And more. And as a consequence, I want to know if the same type of indulgence in error has been occasioned with respect

to the Fryingpan-Arkansas as was with respect to the Colorado-Big Thompson.

Mr. DEXHEIMER. May I answer that one?

Mr. HOSMER. I will be glad to have you because I want to hear from you, Mr. Dexheimer, in light of what you said before the committee.

Mr. SISK. Mr. Chairman, a point of inquiry. Does Mr. Haley have the time now or who has the time?

Mr. ASPINALL. The gentleman from Pennsylvania has the time.

Mr. SISK. I thought he yielded to the gentleman from Florida.

Mr. ASPINALL. The gentleman from Florida asked a question and got the answer. The time is back now to the gentleman from Pennsylvania.

Mr. HALEY. May I correct the chairman? I got "a" answer.

Mr. ASPINALL. If the gentleman is not satisfied with the answer, he will be able to have his own time, I hope.

The gentleman from Pennsylvania.

Mr. HOSMER. I have a question pending here.

Mr. SAYLOR. Yes; and then I have got some more.

Mr. HOSMER. Mr. Dexheimer, you were going to answer that question.

Mr. DEXHEIMER. The original plans on the Colorado-Big Thompson in many cases provided open canals but discharging into the river for the carriage through a large part of the mileage of the project down to the eastern slope. That would mean in winter operation you would be picking up floating ice or maybe some solid ice each time you picked out of the river, and for a power operation, of course, that would not be as practical, and they changed the plan on review in Denver, in the same manner that Mr. Lindseth indicated the change upon review that had been made on the Fryingpan-Arkansas, and decided that was not as practical and went to tunnels instead.

Mr. HOSMER. Does not the power system in this instance on the Fryingpan-Arkansas project include diversions from the Arkansas River and tributaries, not just from these reservoirs?

Mr. DEXHEIMER. I think not in the wintertime, Mr. Hosmer. It certainly provides diversion during the flood flows, melting snows.

Mr. HOSMER. Mr. Dexheimer, have you done some study on this project since the last time you were up here?

Mr. DEXHEIMER. Not a great deal; no, sir.

Mr. HOSMER. I am just going to quote to you what happened when you were up here last time. I asked you this question with respect to the Big Thompson:

> You have had some trouble up there with open canals at high altitudes, have you not?
>
> Mr. DEXHEIMER. No, not that I know of.

Mr. Dexheimer, were you attempting to hold something back from the committee last time when you were here?

Mr. DEXHEIMER. No, sir, because we did not build those open canals in the Colorado-Big Thompson in the manner that was originally planned and we have not had the trouble with the ice.

Mr. HOSMER. My questions were directed to the original planning of that project, and I asked you if some changes had to be made in the original plans, and you told me "No."

Mr. DEXHEIMER. I probably did not understand what you meant by original plans. We have a statement here that might clear that up. A large part of that was made on cost basis also.

Mr. HOSMER. I know, but we have testimony from even such people as Mr.—the Commissioner in the previous administration—what was his name?—in the testimony that Mr. Saylor referred to, the portions that he quoted from were from a statement by Michael W. Straus, Commissioner; Kenneth Markwell, Assistant Commissioner; H. F. McPhail, Director of Power Utilization; and A. R. Goethe, who all made attribution of this vastly increased cost in the Big Thompson to the necessity in changing the plans to closed conduits from open canals. You stated that you did not believe there were any diversions in the wintertime from the Arkansas River and tributaries. Perhaps one of these gentlemen who are more familiar with the project can give us some information on that point.

Mr. POWELL. There are no diversions from the Arkansas River in the wintertime into these power canals.

Mr. HOSMER. You are getting your entire 69,000 acre-feet out of the Fryingpan portion during the winter?

Mr. POWELL. That does not come in the wintertime. I can give you the percentages that come——

Mr. HOSMER. Are you getting it all out of the reservoirs from dead storage at that time?

Mr. POWELL. That is right, sir.

Mr. HOSMER. Is there not freezing on the surface of these reservoirs?

Mr. POWELL. Yes, sir.

Mr. HOSMER. And do not those reservoirs go into the canals and carry the ice with them?

Mr. POWELL. They go in. As I stated a minute ago, they go in at a temperature of 39 degrees. That is the heat of water at maximum density at the bottom of the reservoirs and the water still has 144 heat units of heat in it when it goes out into the canal.

Mr. HOSMER. What were the comparable calculations in connection with the Big Thompson?

Mr. POWELL. They do not, Mr. Hosmer—even in their original begining they never had the comparable situation.

Mr. HOSMER. I see Mr. Saylor is anxious to get back. I will question you later.

Mr. SAYLOR. I think I ought to comment at this time since Mr. Dexheimer is here and has seen fit to appear out in the area where these projects are built and say that you and I do not deal in facts, that he might have some cause to realize that some of us are trying to get the facts but we cannot get the Bureau of Reclamation to give us the same story twice.

Now your predecessor gave us 1 story and gave Congress 1 story as to why the change in the Colorado-Big Thompson, and he said that they found they could not use those canals and they had to build them over. That was not in any planning stage in Denver, Mr. Dexheimer. They came to Congress and asked for an authorization and you know it. You got this thing authorized with an open canal because if you had ever told Congress how much it was going to cost in the first instance they would never have authorized it, and you know it. I want to know——

Mr. ASPINALL. Just a minute. The Chair wants to suggest to the gentleman——

Mr. SAYLOR. The Chair can suggest. We have before us a gentleman who has seen fit to go out in public and malign several Members of Congress. This is the first chance I have had to see the gentleman since.

Mr. DAWSON. Mr. Chairman——

Mr. SAYLOR. I refuse to yield. He has seen fit to go out and malign Members of the Congress, and it little behooves people in the executive of the Government to do so.

Mr. DAWSON. Mr. Chairman——

Mr. SAYLOR. People have a right to have an honest difference of opinion.

Now I want to ask the next question.

Mr. DAWSON. Mr. Chairman, I raise a point of order that the gentleman is not asking questions. He is not giving the witness an opportunity to answer any of the questions. He is making an attack on the witness. The gentleman is out of order.

Mr. ASPINALL. The gentleman has stated he is going to go ahead with his questioning now.

Mr. SAYLOR. I want to know what it will cost if you have to go to tunnels or cover these canals?

Mr. DEXHEIMER. I do not think we have any cost figures on that, Mr. Saylor.

Mr. SAYLOR. Would it double the cost?

Mr. DEXHEIMER. Without a study of the mileage, the size, and the amont of coverage, and so on, I would not want to hazard a guess.

Mr. HOSMER. Will the gentleman yield?

Mr. SAYLOR. Yes.

Mr. HOSMER. At the risk of having the allegation made that my statements are not factual, confirmed, I would like to quote from what the Bureau told you [Mr. Saylor] as to the cost.

Mr. Dexheimer, were you on January 1954 in position in the Bureau?

Mr. DEXHEIMER. Yes.

Mr. HOSMER. What was your position at that time?

Mr. DEXHEIMER. Commissioner.

Mr. HOSMER. You were Commissioner of Reclamation. This study prepared by you stated that the cost increase would be $64 million.

As I say, I quote you at the risk of being again maligned as not factual.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. Not at this point.

It is my understanding that the land in the Arkansas Valley that is to be irrigated is already 30 percent short in water supply. Is that correct?

Mr. DEXHEIMER. I think that is approximately correct; yes.

Mr. SAYLOR. If this project were authorized, it would not supply the shortage. Is that correct?

Mr. DEXHEIMER. I think Mr. Powell can probably answer that as to specific quantities.

Mr. POWELL. Mr. Saylor, it supplies practically 100 percent of water for a period of almost 20 years; then we hit the drought, bad situation, and the supply falls down. The average shortage is still 15 percent. Tolerated shortage on irrigation is 10 percent.

Mr. SAYLOR. What do you mean by "tolerated shortage"?

Mr. POWELL. You can have a shortage of 10 percent for a short period and it is not serious. You can even run higher for a very short period.

Mr. HOSMER. Will the gentleman yield again?

Mr. SAYLOR. I will in a minute.

Yet, in the figures with which you have come before this committee you indicate this will only supply 50 percent of the shortage over the entire period. Is that correct?

Mr. POWELL. On the average basis that is approximately correct.

Mr. SAYLOR. Now I yield.

Mr. HOSMER. That is exactly the point I was getting at. You testified this morning that the crops now get about 3 acre-feet and the shortage is 30 percent, which would make it about 1 acre-foot. As testified, this entire project will only provide a half an acre-foot. So his figures of shortage of 50 percent would seem to be confirmed, but I think he intimated it was only a 10 percent shortage. Did you mean that the present shortage would be reduced by 50 percent?

Mr. POWELL. That is right, sir—from 34 to 15. I think those are the figures. I think that is correct.

Mr. HOSMER. Notwithstanding all this investment, you would still have too small an amount of water to adequately produce the crops that you want to produce thereon—what, 300,000 acres?

Mr. POWELL. I would not state it that way. We have enough water to benefit the situation so that we can cover the repayment that we set down in the report as possible from the farmers.

Mr. HOSMER. You are still not going to have first-class farmlands, are you?

Mr. POWELL. Sir?

Mr. HOSMER. You are still not going to have first-class farmlands, are you, from the water availability standpoint even if you build this thing?

Mr. TOMLINSON. I think I can add something there, Mr. Hosmer. In working out a water supply you compute the ideal water requirements, and then when you are designing your water supply features, if it does not run into too much expense, you try, of course, to provide as much water as you can, but you soon reach a point of diminishing returns. Various irrigation engineers have different rules of thumb. But generally it is around 90 percent of the ideal water supply which is considered a satisfactory and very efficient supply. If you got up to 100 percent, the price of that extra 10 percent would be so expensive it would not be worthwhile, and they usually have a leeway of around 10 percent on the average and perhaps down to, maybe, say, 30 percent every 10 years and still call it satisfactory.

Now various irrigation engineers will change those percentages slightly, but that is the general range. So the water supply after the project is developed will be in the order of 15 percent on the average short of ideal, and that will be pretty close to what is considered a very satisfactory and efficient water supply situation.

Mr. HOSMER. Fine. That opens up a line of questioning. I will yield back and return to that on my own time.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SAYLOR. I will yield to the gentleman from Colorado.

Mr. CHENOWETH. I would like to clear up this covered ditch situation and the controversy which Mr. Saylor has been asking about.

Is it not reasonable to assume, Mr. Dexheimer, that if a mistake was made on the Colorado-Big Thompson—and I am not saying it was made—there are different opinions concerning that situation—but assuming a mistake was made, is it not reasonable to assume that engineers in the Bureau of Reclamation would be doubly cautious, and take extraordinary pains to be sure that a similar mistake was not repeated in the Fryingpan? Is that not reasonable to assume?

Mr. DEXHEIMER. Yes, sir.

Mr. CHENOWETH. Was that done?

Mr. DEXHEIMER. In the case of the Fryingpan-Arkansas, I can assure you that it was—that this has had the study and the approval of the best minds in the country in that regard.

Mr. CHENOWETH. Has the situation been checked by engineers outside of the Bureau, independent engineers?

Mr. DEXHEIMER. I am quite sure they have. I could not name them.

Mr. CHENOWETH. And they have concurred in the findings of the Bureau?

Mr. DEXHEIMER. Yes.

Mr. CHENOWETH. How many different checks and doublechecks has the Bureau of Reclamation made on this feature of the Fryingpan-Arkansas project?

Mr. DEXHEIMER. I could not say just how many.

Mr. CHENOWETH. A report came from Mr. Powell's office. After the report came to the Denver office, how many engineers and Bureau chiefs, checked the report concerning this feature of the project?

Mr. ASPINALL. Just a minute, please.

Would the gentleman from Pennsylvania yield to his chairman?

Mr. SAYLOR. Yes, sir.

Mr. ENGLE. Thank you. Off the record.

(Discussion off the record.)

Mr. ASPINALL. The gentleman from Pennsylvania has the time and his yielded to the gentleman from Colorado.

Mr. CHENOWETH. Go ahead, Mr. Dexheimer, if you recall the question.

Mr. DEXHEIMER. I am quite sure that has been reviewed many times. I could not tell you how many engineers, but dozens of the best experts have reviewed these things in their particular field.

I would like, if it would be appropriate or helpful to the committee, to submit for the record a report on the Colorado-Big Thompson by a similar board of engineers that might clarify some of the problems, which board had the problem before them of making the change on the Colorado-Big Thompson. This is the board's report on that change. It might be helpful if the committee desires.

Mr. CHENOWETH. Just why was that change made on the Big Thompson?

Mr. DEXHEIMER. Largely for financial reasons.

Mr. CHENOWETH. It was not for the physical operating conditions then that have been referred to in the Fryingpan?

Mr. DEXHEIMER. No, sir.

Mr. CHENOWETH. I think that point should be cleared up once and for all, Mr. Chairman. The Big Thompson has been referred to many times here.

Mr. SAYLOR. Am I correct, Mr. Dexheimer, in understanding you say the reason they changed the Colorado-Big Thompson was not that it would not operate?

Mr. DEXHEIMER. That is correct.

Mr. SAYLOR. Mr. Chairman, I ask at this point that our staff excerpt from the hearings on the third supplemental appropriation bill of 1948 from the testimony of Michael Straus, the Commissioner of Reclamation, his explanation to the Congress as to why the plans had to be changed for the Colorado-Big Thompson, because I think it is extremely important.

Mr. ASPINALL. The first request is to insert the document to which Commissioner Dexheimer referred. If there is no objection——

Mr. HOSMER. I have not seen it yet, so I will reserve my right to object until I do.

Mr. DAWSON. Mr. Chairman, I move it be made a part of the record.

Mr. ASPINALL Just a minute. If the gentleman from California is interested in it, why not come up here and examine it.

Mr. CHENOWETH. May I ask another question?

Mr. ASPINALL. No. No further matter is in order here until the question is taken care of.

Mr. SISK. Would an inquiry be in order?

Mr. ASPINALL. Off the recod it would.

(Discussion off the record.)

Mr. ASPINALL. Back on the record.

Mr. HOSMER. Mr. Chairman, I would like to ask the witness one question about this.

Mr. ASPINALL. Mr. Hosmer.

Mr. HOSMER. I have just hastily glanced at this document. Mr. Dexheimer, what is in it that bears on the question of these open canals and closed conduits, the change in routes?

Mr. DEXHEIMER. That board report covers the reason and their judgment on the change that was made in the Colorado-Big Thompson project.

Mr. HOSMER. In connection with that, was not the primary reason for the change in the Rattlesnake route to pick up more capacity?

Mr. DEXHEIMER. The Rattlesnake route is just a tunnel carrying on from another tunnel rather than to carry the water in the river channel.

Mr. SAYLOR. The only comment I have to make on this, Mr. Chairman, is that——

Mr. ASPINALL. Just a minute. A comment will not be in order.

Mr. SAYLOR. I think we should have an explanation, because apparently there has been a correction made in the figures in pencil since this was run off. We should know what figures are correct.

Mr. TOMLINSON. I think the figure Mr. Saylor refers to, Mr. Chairman, is in the Rattlesnake route. The cost estimate was typed in one place $20,976,775, and the other figure was $21,976,775. I think the figure is $20,976,775. I am informed that this is a typographical error, and the figures which back it up support that. It is not material. That $1 million—while a million dollars, I want to emphasize, is a large amount, it is still relatively small in comparing a 20 or 21 million dollar figure with a $27 million figure, and no matter which it was, it would not change the conclusions, I would say, in this particular case.

Mr. HOSMER. Did not the adoption of the Rattlesnake route involve an expense increase from $8 million to some $25 million, and was not also the matter of walk slides a consideration in connection with it?

Mr. TOMLINSON. I can give you my opinion, if you wish it, sir. I was not associated with the project at the time this report was made or when the change was switched over, but, as I understand it, that was part of the consideration, the condition of the topography upon the Colorado-Big Thompson was more precipitous and steep than it is in the upper Arkansas. Also that the Rattlesnake route, which was estimated to cost around $21 million, as compared with the open route of 27 and a fraction million dollars—and I inquired about what they actually built it for, and I understand that if you indexed up the $21 million figure based on the 1946 indexes to the index prevailing at the time the work was done, they built it for within about 3 percent of what the indexed-up cost would be. So it was done cheaper, you might say, than if they had gone to the canyon route which was in the original plan before the change was made.

Mr. HOSMER. According to the Senate hearings, the cost went up from $8 million to $25.6 million.

With that statement, I will withdraw my reservation because I do not think the document means anything anyway.

Mr. TOMLINSON. I think the $8 million figure——

Mr. ASPINALL. The Chair will ask the gentleman to withdraw his last statement. It is not considered to be in order at this time.

Mr. HOSMER. You want my last statement withdrawn?

Mr. ASPINALL. Yes.

Mr. HOSMER. I will be glad to withdraw it and state that in my opinion it means nothing.

Mr. SAYLOR. My next question——

Mr. ASPINALL. Just a minute. Without objection, the request of Mr. Dexheimer will be granted and the statement referred to will be made a part of the record.

Hearing no objection, it is so ordered.

(The document referred to follows:)

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
July 12, 1946.

From: Board of Engineers.
To: Director, region 7, Chief Engineer, Denver, Colo.
Subject: Final report on proposed plan and estimated cost for Estes-Foothills power system, Colorado-Big Thompson project, Colorado.

1. There is submitted herewith the final report of the board of engineers on the Estes-Foothills power system of the Colorado-Big Thompson project.

2. Correspondence and discussions between the regional office and the Chief Engineer relative to plans and estimates of cost for the Colorado-Big Thompson project resulted in the appointment, on May 20, 1946, of this board of engineers, who were to review the 1937 plan for the Estes-Foothills power system (designated in the 1937 report, S. Doc. 80, as power canals Nos. 2, 3, and 4), recommend revisions for practicable construction and prepare an estimated cost for the revised recommended plan for the so-called canyon route, which is a modification of the plan for power canals Nos. 2, 3, and 4 in the 1937 plan. An interim report dated May 17, 1946, outlined a proposed modified plan for the canyon route, and set up basic unit costs for the preparation of estimates for required features, which was to be considered and compared with plans and estimates for the Rattlesnake route, partial estimates for which were submitted by the project engineer under date of May 22, 1946. It was indicated that estimates for the power features and a complete total estimate for the

two routes would be reviewed and completed by the regional and Chief Engineer's offices. Inasmuch as determinations of unit costs for the canyon route involved consideration of construction problems and conditions on possible alternative routes, the most feasible of which appeared to be the Rattlesnake route, the board of engineers concluded that its considerations would not be complete without a review of the estimate for the Rattlesnake route, recommended by the project engineer; and the submission of an appropriate recommendation for the selection of the final plan for the Estes-Foothills power system. This was indicated in the concluding paragraph of the interim report.

3. Comparison with the Rattlesnake route: In order to arrive at a conclusion as to the most suitable route for the Estes-Foothills power system, the board of engineers made a field inspection of both routes and reviewed previous plans for each route in connection with considerations on the canyon route. Conditions and factors affecting cost of construction were carefully considered and discussed in arriving at recommended unit prices which were used in the preparation of the estimates which are attached. As a basis for comparative considerations, both plans provide for a maximum flow of 550 second-feet in tunnels, conduits, and power penstocks. Neither plan nor estimate provides for any intermediate storage for reserve or power-peaking capacity, and the comparison is purely on the basis of estimated cost for the physical features required without consideration of relative power advantages for either route. The general plans for each route are briefly described in the attached report, the first page of which shows a summary of cost for all features of the two routes.

4. Conclusion: The summary sheet shows the following total costs and power capacities based on 1946 costs:

	Cost estimate	Installed capacity
		Kilowatts
Canyon route	$27,748,300	93,000
Rattlesnake route	20,976,775	94,100

On the basis of the foregoing estimated costs and installed electrical capacities, the Board of Engineers recommends that the Rattlesnake Route, shown on sketch sheet 4, be adopted as the approved plan for the Estes-Foothills power system and that the above estimate be used as the estimated cost for this power system in the revised total estimated cost for the entire project. Previous studies have indicated that the Canyon Route has some advantages in that it would provide greater flexibility in permitting construction and power development by stages. Inasmuch as completion of the project was delayed several years by the war and probable power demands in this area would utilize all of the power developed as soon as the project could be completed, it is believed that there will be no need for stage development. In addition to lower cost, the Rattlesnake Route has the added advantage of practical reservoir sites for future reserve storage or power peaking capacity, which can later be provided with only minor modifications in the aqueduct and conduit system.

5. Other alternatives: Past studies and reviews of the 1937 plan and recommended proposals of the project engineer have resulted in the development of several alternatives besides the Rattlesnake Route, which were given only limited consideration because of lack of complete data. It is believed, however, that application of current unit costs of construction to the preliminary estimates for the various alternatives that have been proposed, will indicate total costs much higher than those shown in the estimates for the Canyon and Rattlesnake Routes with few, if any, additional advantages. The project engineer, has, from time to time, suggested modifications of the Canyon Route, such as the substitution of the Stone Mountain tunnel between powerplants Nos. 2 (Drake) and 3 (trading post), which might improve the plan for the Canyon Route. However, these alternatives are an approach to the plan for the Rattlesnake Route, and none of them have any lower costs or any advantages over the Rattlesnake Route, and, therefore, were not studied by this Board. If there is

any reason for the adoption of the Canyon Route, these modifications should be later considered in connection with final plans.

(Signed) A. B. REEVES,
Engineer.
(Signed) HAROLD H. BENNET,
Engineer.
(Signed) W. E. BLOMGREN,
Regional Engineer.
(Signed) LEIGH G. CAIRNS,
Engineer.
(Signed) ROGER RHOADES,
Geologist.
(Signed) C. H. HOWELL,
Project Engineer.

Approved:

(Signed) WALKER R. YOUNG,
Chief Engineer.
(Signed) E. B. DEBLER,
Regional Director.

Mr. ASPINALL. The gentleman from Pennsylvania has a request.

Mr. SAYLOR. My request is that in view of the present testimony our staff be instructed to get the hearings before the House Appropriations Committee for the Third Supplemental Appropriation for 1948, digest the reasons there given, and present them to the committee to determine what will be done with them after that.

Mr. CHENOWETH. Reserving the right to object. I think the Chair has been very liberal and very charitable and very generous in permitting the opponents of this project to go into the Big Thompson project and some of the reasons for the increased costs there. The Big Thompson project is completed. It is now in operation. We are not holding hearings on the Big Thompson project.

Now Mr. Dexheimer, the Commissioner of Reclamation has stated positively, without equivocation, that in his opinion as Commissioner of Reclamation the operating features of the Fryingpan-Arkansas project are feasible and have been approved, checked, and double-checked time after time. I see no reason to go now into this collateral issue and into testimony before an Appropriations Committee some 6 or 7 years ago as to what some other witness may have said as to why the costs of the Big Thompson were increased. I see no connection whatever between that statement and these hearings the committee is now conducting.

Mr. ASPINALL. Does the gentleman wish to object or does he withdraw——

Mr. CHENOWETH. What is the time element involved in this request, Mr. Saylor? Is it something that is going to further prolong these hearings or something that can be done expeditiously?

I have no particular objection to the request. As far as I can see it means absolutely nothing. It is purely on a collateral issue and not on an issue which is before this committee in this hearing.

Mr. ASPINALL. Mr. Dexheimer, do you understand the request made by the gentleman from Pennsylvania?

Mr. DEXHEIMER. I understood, Mr. Chairman, that request was for the committee staff to gather information from hearings in 1948, with which we had nothing to do, on another project.

Mr. ASPINALL. Is it readily available?

Mr. DEXHEIMER. I would imagine.

Mr. SAYLOR. Off the record.

(Discussion off the record.)

Mr. CHENOWETH. Further reserving the right to object, I assume the only purpose of the introduction of this testimony, whatever it is, is to seek to discredit the present witnesses from the Bureau of Reclamation now before this committee.

The gentleman from Pennsylvania has been very critical this morning of the witnesses. I do not think this committee should be seeking to dig up ancient hearings to discredit witnesses now appearing who have stated positively and without equivocation that the features of this project are correct from an engineering standpoint.

Mr. HOSMER. Will the gentleman yield?

Mr. CHENOWETH. I do not know that I can.

Mr. ASPINALL. The gentleman from Colorado has the time.

Mr. HOSMER. Will the gentleman yield?

Mr. CHENOWETH. Yes.

Mr. HOSMER. I am not concerned so much with this personality argument and so forth. What I am concerned with—and this is for the benefit of all of you gentlemen—is the statement you are going to have open-canal operations here, which was made this morning, and the statement in the material you submitted in response to Mr. Saylor's questions that:

> The project power system has been planned and facilities provided for maintenance of a permanent ice cover in the winter months.

And further you state that the studies that were made in connection therewith indicated there would be no serious problems from frazil or anchor ice.

So my position is that I do not understand what kind of an operation you have got here because you have had conflicting statements; and if, as a matter of fact, you do have an ice problem and have to cover these things, your cost is going to go up $64 million according to your own testimony.

Now this particular project takes only one-third of the water. The other two-thirds come out of the Arkansas River. Maybe we are getting ourselves into a bog here from which the taxpayers are not going to be able to pull their financial boots.

That is what I want to satisfy my mind on.

Mr. SISK. Will the gentleman yield?

Mr. CHENOWETH. I yield to the gentleman from California.

Mr. SISK. I would just like to make a point of inquiry from the gentleman who has made the request as to what the purpose of the request is. Why do you want these hearings made a part of the record?

Mr. SAYLOR. I did not ask to have them made a part of the record at this point. I just asked that the staff members be instructed to examine them and report what was testified by the Commissioner of Reclamation and inform the committee and the committee to do what they would. I have not asked that it be made a part of the record.

Mr. SISK. What do these hearings deal with?

Mr. SAYLOR. These hearings deal with the reasons for the increased costs in the Colorado-Big Thompson. We now have a project which is being proposed to be erected which has some canals that are 500 feet higher and some at the same elevation and some 500 feet lower than

the canals in the Colorado-Big Thompson. Heretofore the Commissioner of Reclamation has given to Congress the reasons why they had to change the plans.

We have had before this committee from the Bureau testimony, first, that it will never freeze over; second, that they expect to operate it as an ice-covered canal. In view of the conflicting statements, I think we should get the comparison. You also have the answer from the Bureau as to what the increased costs would be if they have to cover these canals.

Now I am just asking that the staff be directed to go back and get the records in 1948 when the question came up before Members of Congress why the increased costs of the Colorado-Big Thompson.

In view of the three positions that we now have the Bureau of Reclamation in, on this one project, as far as canals alone are concerned, I think that we should have the benefit of—quoting our good colleague from Missouri, Mr. Christopher, on the floor yesterday, "We can only judge the future by the past." And I think we ought to have the past brought to us.

Mr. SISK. If the gentleman will yield further. I just had a feeling that this possibly was something to discredit the Bureau. Of course, the gentleman knows that he and I disagree on our feelings with reference to the Bureau. I am not——

Mr. ASPINALL. The Chair suggests that it is past our hour; that the gentleman from Pennsylvania has the right to make the request of the staff individually if he wishes to do so. So there is nothing to be gained by the committee passing on the question.

Without objection it is so ordered.

Hearing no objection, it is so ordered.

The Chair understands we cannot meet this afternoon, so the committee will stand adjourned to the call of the Chair.

(Whereupon, at 11:05 a. m., the subcommittee adjourned, to reconvene at the call of the Chair.)

FRYINGPAN-ARKANSAS PROJECT, COLORADO

SATURDAY, JULY 16, 1955

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION OF
THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D. C.

The subcommittee met at 9:30 a. m., Hon. Wayne N. Aspinall (chairman) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will please be in order.

The Chair asks unanimous consent that the subcommittee take up H. R. 412, and that the business that was regularly scheduled before the committee be postponed until the next scheduled meeting.

Off the record, the Chair will explain the situation.

(Off-the-record discussion.)

Mr. ASPINALL. Does everyone understand the request of the Chair?

Mr. ROGERS. Reserving the right to object, Mr. Chairman, I want to know, that insofar as the parliamentary procedure is concerned, I want it known that no rights will be jeopardized or lost by such unanimous consent request, if granted. What I am thinking about is this: I do not want to see someone come in with a situation, or take a position on Tuesday by virtue of some technical proceeding on the part of this procedure, that some right was lost. I think this is a matter that should be heard out on its merits; I think it should be heard on its merits.

Mr. ASPINALL. I think the Chair ought to state to the gentleman from Texas that the Chair has requested witnesses to be here this morning and they are appearing for the third time, and if we get into a hassle on this other question, there will be no quorum present and the witnesses will have to be sent back; and the gentleman from Colorado, Mr. Chenoweth, will be unable to have the testimony presented on this bill.

Mr. ROGERS. Further reserving the right to object—and please do not misunderstand me, because I have no objection to going ahead with the testimony on the Fryingpan-Arkansas project. The only thing I want to do is this: I do not want to find ourselves having some person who is presently absent from this committee saying that his rights have been jeopardized, so I think we ought to have a clear understanding on that.

Mr. ASPINALL. The Chair will ask counsel if it is not true that such a request leaves everything in the status quo.

Mr. ABBOTT. It is my understanding, Mr. Chairman—and I consulted with some of the people in the Parliamentarian's office—that in

view of the fact this meeting today was a regularly scheduled meeting, the normal procedure would be to dispose of any pending business.

The pending business, in the view of the chairman is the motion to indefinitely postpone the further consideration of all of the so-called Hells Canyon bills on which the previous question was moved and carried yesterday. The normal pending business would be taken up, after the unanimous-consent request was in effect, and in the normal proceeding would permit this hearing.

As the Chair stated, the next scheduled meeting was——

Mr. CHENOWETH. Tuesday.

Mr. ABBOTT. And the next scheduled meeting would have the regular notices and, by agreement of the committee this morning, would be carried over as the pending business on Tuesday.

Mr. ROGERS. In other words, let me say this—and still reserving the right to object, with all this talk, and I understand all that, but the situation is simply this, as I understand counsel, that the right of members of this committee to have the pending business—which is the motion that was made by the gentleman from Nebraska, Mr. Miller, taken up on Tuesday and will not be in any manner jeopardized by the proceedings that would be followed if the—if we adopt the unanimous-consent request of the chairman?

Mr. ABBOTT. That is my understanding, Mr. Rogers, because in effect you are simply agreeing to proceed out of regular order.

Mr. METCALF. Mr. Chairman?

Mr. ASPINALL. The Chair recognizes the gentleman from Montana.

Mr. METCALF. I just want to get this clear in my own mind: If I understand the motion, it would be the first order of business this morning; would be the first order of business next Tuesday?

Mr. ASPINALL. The gentleman is correct.

Mrs. GREEN. Mr. Chairman?

Mr. ASPINALL. The gentlewoman from Oregon.

Mrs. GREEN. Reserving the right to object, Mr. Chairman, may I ask, concerning the hearings on the Fryingpan-Arkansas project, if it is contemplated at this time, at the conclusion of the hearing, to draw up a bill on the Fryingpan-Arkansas project?

Mr. ASPINALL. The lady was interviewed by the chairman some time ago and she was asked if she had any questions to ask the witnesses who are now ready to take the witness stand, and the lady said no. But the witnesses who are present will be questioned by the gentleman from California, Mr. Sisk; the gentleman from Pennsylvania, Mr. Saylor, if he is here; the gentleman from California, Mr. Hosmer, if he is here; and the gentleman from Colorado, Mr. Chenoweth, which is to take approximately 50 minutes. We will then adjourn the meeting. There will be no writing up of the bill on the Fryingpan-Arkansas project this morning.

Mr. BUDGE. Mr. Chairman.

Mr. ASPINALL. The gentleman from Idaho, Mr. Budge.

Mr. BUDGE. Reserving the right to object, with respect to the Chair's unanimous-consent request, I think we should be advised, and I have no desire to shut off or foreclose the witnesses from completing their testimony on the Fryingpan-Arkansas project, but in view of the fact that a quorum is not here, I think that the actual time of taking up this matter should be postponed until the next meeting of the committee, so I would ask that the Chair divide this unanimous-consent request.

I am not objecting to proceeding this morning but I feel we should not pass upon a time certain to vote upon the pending business when the author of the motion is not present this morning and a quorum is not present.

I think that should be left to a later date.

Mr. ASPINALL. The Chair made the unanimous-consent request because that was the only way we could proceed. Do I understand the gentleman from Idaho is opposed to the request?

Mr. BUDGE. If the Chair will make the unanimous-consent request in this way, that we proceed out of order to hear the Fryingpan-Arkansas project this morning and that at the next meeting of the committee, the committee then can decide the question as to whether or not it will vote upon Dr. Miller's motion.

Mr. ASPINALL. That is all that the request was. The gentleman must have misunderstood the request of the Chair. The chairman explained (off the record) that at the next regularly scheduled meeting——

Mr. BUDGE. On Tuesday.

Mr. ASPINALL. But if we did not have a quorum at that time, at the next meeting——

Mr. BUDGE. I may have misunderstood the unanimous-consent request; it was my understanding that the Chair included in it that the first order of business at the next meeting would be the pending business.

Mr. ASPINALL. That would be the regular order of business, but the Chair did not include that in his unanimous consent request.

Is the Chair right in that, Mr. Abbott?

Mr. ABBOTT. I understand, Mr. Aspinall, it is my understanding that the parliamentary situation remains pending. It is simply a matter that is pending, and if not called up would not be acted upon.

Mrs. GREEN. Reserving the right to object——

Mr. ASPINALL. The gentleman from Idaho still has the floor.

Mr. BUDGE. That is the only thing that I wanted clearly understood, that we are not this morning fixing a time certain to vote on Dr. Miller's motion.

Mr. ASPINALL. The Chair's request was made with the understanding that the motion of the gentleman from Nebraska remained the pending order of business.

Mrs. GREEN. Reserving the right to object, may we have the record show that Tuesday morning this will be the pending business?

Mr. ASPINALL. Will the reporter read the chairman's unanimous-consent request?

(The reporter read as follows:)

The Chair asks unanimous consent that the subcommittee take up H. R. 412.

Mr. ASPINALL. The Chair made the unanimous consent and then went off the record to explain the pending situation.

Mr. ENGLE. Mr. Chairman——

Mr. BUDGE. Was any of this discussion on the record?

Mr. ASPINALL. I think perhaps the discussion on the reservation made by the gentleman from Texas and others is in the record.

(Off the record discussion.)

Mr. ENGLE. Will the gentleman yield?

Mr. ASPINALL. I yield to the gentleman from California.

Mr. ENGLE. Mr. Chairman, I ask unanimous consent that the committee proceed out of order to hear H. R. 412, without prejudice to pending business.

Mr. ASPINALL. The Chair asks permission to withdraw his unanimous-consent request at this time.

If there is no objection, it is so ordered.

Mr. ROGERS. Mr. Chairman, there is just one thing that I want to have clear, in view of the fact that there have been some things going on recently, if the motion of the gentleman from Nebraska is the pending business, that will be the first thing that is taken up Tuesday morning?

Mr. ASPINALL. That is right.

The Chair's unanimous-consent request has been withdrawn. You have heard the request of the gentleman from California.

Mr. BUDGE. Reserving the right to object, Mr. Chairman——

Mr. ASPINALL. Pardon me, will you allow me to conclude?

Mr. BUDGE. Certainly.

Mr. ASPINALL. The Chair asks unanimous consent that he be permitted to withdraw his unanimous-consent request. Is there objection? The Chair hears none. It is so ordered.

The Chair recognizes the gentleman from California, Mr. Engle, to make a unanimous-consent request.

Mr. ENGLE. I want to make a request that would meet the suggestion of the gentleman from Idaho which is that I ask unanimous consent that we proceed out of order to take up H. R. 412 without prejudice to pending business.

Mr. ASPINALL. Is there any objection to the request of the gentleman from California?

Mr. BUDGE. I still have my reservation. I think, since the author of the motion has just entered the room, he ought to be acquainted with the proceeding before the unanimous-consent request is acted on.

Mr. MILLER. May I make a parliamentary inquiry?

Mr. ASPINALL. Certainly.

Mr. MILLER. The pending motion before the committee is to indefinitely postpone the hearings—postpone action on the Hells Canyon bill?

Mr. ASPINALL. Yes.

Mr. MILLER. And that would be the matter that would be taken up at the next meeting?

Mr. ASPINALL. Yes.

You have heard the request of the gentleman from California, Mr. Engle. Is there objection? If not, it is so ordered.

The committee will now proceed to the consideration of H. R. 412.

Will the witnesses from the Bureau take their position at the witness stand?

STATEMENTS OF G. E. TOMLINSON, C. B. JACOBSON, BEN POWELL, AND E. V. LINDSETH

Mr. ASPINALL. The Chair recognizes the gentleman from California, Mr. Sisk, for approximately 10 minutes.

Mr. SISK. Thank you, Mr. Chairman.

I would like to discuss for just a few moments the specific problems of the Arkansas River development alone forgetting the Frying-

pan sources of the project. Now, I am sure that you gentleman are familiar with the testimony given before this committee by Mr. Raymond Matthews, the chief engineer of the Colorado River Board of Colorado, with reference, to the feasibility—and of course in his case—the advisability, of developing only that portion of the project known as the Arkansas River.

Now, I would like to inquire of you gentlemen this morning, whichever one of you feels you would like to answer, as to just what extent the elimination of the transmountain diversion would have upon this overall project.

Mr. TOMLINSON. Mr. Chairman, my name is George E. Tomlinson. I am Assistant Chief, Division of Project Development, Bureau of Reclamation. I will be happy to undertake to answer that question.

I read the statement which you referred to, and in fact I was here when it was made. One of the first things the Bureau of Reclamation did when it started the investigation of a project in the upper Arkansas area was to consider just the type of proposal that was suggested by the other witnesses, namely, one that was devoted exclusively to the use, reregulation, and better control of all of the Arkansas River water, rather than importing water.

That was found infeasible from every approach tried.

This particular area of the State is known for its own private development of irrigation. There are many private developments of irrigation projects built there—some very large irrigation works. When they had the huge floods in 1921, they, on their own, engaged a consulting engineer, and developed their own flood-control retention reservoir, channel straightening, and so forth. They also have been trying for many, many years, to develop the simplest and cheapest feasible irrigation development they could. In fact, they got on their own almost enough water for a satisfactory operation now. If it were possible to solve the local problem by the construction of a single storage reservoir, I am convinced that the local residents would have accomplished that long ago. The problem is not that simple.

The witness from California mentioned that by building the Pueblo Reservoir, plus some associated works, and using only the Arkansas River water, that they would have about 92,000 acre-feet a year for sale on an annual basis.

Presumably he got those figures from 18,000 feet of flood-flow reregulation, and 74,000 acre-feet of winter irrigation water, which he would capture and store and regulate in the Pueblo Reservoir which he proposed to build.

He then would sell 20,500 acre-feet of municipal water, as the project plans to do, and 71,500 acre-feet of irrigation water.

There are several inaccuracies in the assumptions which he makes. First, he did not mention that he would be taking away water which is now appropriated for, and used beneficially for, irrigation; he would take their irrigation water and put it in the reservoir and sell some of it for municipal water purposes, without any allowance for the cost, or the cost of negotiating or condemning those water rights, which would come pretty high, as well as cause quite a commotion, because there is a crying need in that area for water for all purposes, irrigation as well as municipal water.

He then points out that this remaining 71,500 acre-feet of water could be sold at approximately the same rate that we would have sold

our project water, plus a small portion of the conservancy district tax, and it would pay out in 50 years.

Mr. SISK. I believe the figure he mentioned was $2.25 an acre-foot.

Mr. TOMLINSON. That was the figure we were using for reregulation of winter flow.

Mr. SISK. Yes.

Mr. TOMLINSON. The $5.40 was new water, but for reregulation of winter irrigation water it was $2.25.

Mr. SISK. Yes.

Mr. TOMLINSON. The point I want to make is that there would not be any conservancy district, for I am certain that those rural areas would not be willing to come into the conservancy district and pay more to get less water than they are getting today.

So I am sure that you could not count on a single rural county joining the conservancy district on such a basis. On the other hand, there would be quite a claim for additional compensation for water which they were losing.

Now, on the other hand——

Mr. SISK. I do not quite get that, and I would like to clarify it if I may.

Mr. TOMLINSON. Yes.

Mr. SISK. I lost you somewhere.

Mr. TOMLINSON. I am sorry.

Mr. SISK. As I understand it, under this proposal that we are discussing, there would be certain people or groups of people who would be expected to contribute to the repayment costs without having received any additional water; did I understand that right?

Mr. TOMLINSON. That is right.

Mr. SISK. Well, I do not quite understand you.

Mr. TOMLINSON. The projected conservancy district would be composed of 8 counties in the Pueblo-Colorado Springs area; only 2 of those are what you might call metropolitan centers. The rest are agricultural areas. Under the present report, they would contribute their share, about 1 mill assessment.

Mr. SISK. Yes.

Mr. TOMLINSON. And at the present time the agricultural uses of the winter water, total 74,000 acre-feet. Under the plan Mr. Matthews proposes to give 71,500 acre-feet of water, for which they would pay the same, as it was proposed they would pay under the project, $2.25 an acre-foot. So, again, they would get less water by greatly more than 22,500 feet a year.

Mr. SISK. Now, let me clarify that just a moment if I may.

Mr. TOMLINSON. Yes.

Mr. SISK. It is your opinion that the basis of the feasibility report is that on the additional price that would be paid for the municipal water—the figure was something like 20,000 acre-feet?

Mr. TOMLINSON. Yes.

Mr. SISK. Of municipal water. And that the irrigators themselves would gain no advantage from this proposed project; is that correct?

Mr. TOMLINSON. That is right. But I have some other points that I would like to make, Mr. Sisk, but we are talking about the irrigation end now.

Mr. SISK. Yes.

Mr. TOMLINSON. But the irrigators would get less water. It is true it would be regulated, and it would be more efficient for them, but there would be less water and they would, in the aggregate, not get as much water as they are getting now.

Now, on the municipal water, he is going to sell 20,500 acre-feet for municipal use, and he got the figures I mentioned, I presume, from the report which clearly stated water supply yields of 18,000 acre-feet of flood flow, and 74,000 of winter irrigation reregulation, on the average. Now, if he took those average figures, and then the cities would be content to buy an average amount per year, of 20,500 acre-feet, he could make his project go perhaps.

But, unfortunately, the flood flows on the Arkansas River are very infrequent, but when they do occur, they come in very large amounts—we have had only about five large floods during the period of study of the report, from 1911 to 1944, and the biggest one flood I think was in 1921. They had a flood in 1915, one in 1921, then in 1923, 1928, and 1942. There were some other floods there, but under the Arkansas River compact, one cannot store water except under certain conditions and those were all, or were practically all, the floods that would have contributed to the Pueblo Reservoir storage.

I asked our field office to make a check on how the Pueblo Reservoir, in catching these flood flows which I mentioned, could provide a municipal water of 20,500 acre-feet as Mr. Matthews indicated could be done; and while it was assumed that the average could be provided still there would be periods as long as 7 years when there was no water whatsoever from these reregulated floods available for the city. In other words, if the cities would be content to take say 40,000 acre-feet in 1 year, and then none in another year, the reservoir would supply an average of about 20,500 acre-feet. Without importing water, you could not assure anyone of a constant yearly flow of approximately 50,500 acre-feet for municipal and industrial water.

Now, there is one other item——

Mr. SISK. Let me pursue that a little further, if I may.

Mr. TOMLINSON. Yes.

Mr. SISK. That, in itself, would be the main point of the need for the transmountain diversion, which is to build up, in those years when you would not have water available, to build up, or what you might call firm up this varying supply which you have in the Arkansas River.

Mr. TOMLINSON. There are more; but that is the principal one, I would say.

Mr. SISK. Well, is that actually the principal one, for the intermountain diversion? I realize that possibly there are some others.

Mr. TOMLINSON. There are others, but I would say that is the principal one. Where you have other sources, you can actually work out this average to an advantage, so that the water will not all be lost in evaporation and other losses.

Now, there is one other item, and that is to sell the 20,500 acre-feet we have to deliver at the river, the Arkansas River that is, the water supply that goes to Colorado Springs. At the present time, we are thinking in terms of delivery at or near Canon City, some 40 miles above the Pueblo Reservoir. But if the water is caught down in the Pueblo Reservoir, then conduits leading to Colorado Springs would be considerably longer and the pumping lift would be higher in getting the water from the Pueblo Reservoir itself to Colorado

Springs which accounts for half the water. It would be more expensive and unless you have these upper reservoirs to regulate the water and deliver to them, you could not provide it.

Now, this alternative is one that we looked into very seriously, and over a number of years, and it just does not work out.

Mr. SISK. Well, you understand I am not contending—but I thought it was something that should be explored in view of the testimony we have had before this testimony relative to the feasibility, and so forth. I can understand that there was a problem, and that is the thing I am concerned with here.

Mr. CHENOWETH. Will the gentleman yield?

Mr. SISK. I gladly yield to the gentleman from Colorado.

Mr. CHENOWETH. I want to say that I deeply appreciate the interest of my good friend from California in this matter and his suggestions about the feasibility of the project.

I want to have Mr. Tomlinson state, or Mr. Powell, who has worked on this project over the years, that such an effort has been made. As a matter of fact the first studies on the project were made in an effort to develop such a project as the gentleman is suggesting, and such as others have suggested, but they have just not been able to work out a feasible project on that basis. Is that correct, Mr. Tomlinson?

Mr. TOMLINSON. That is absolutely correct.

Mr. CHENOWETH. Mr. Powell?

Mr. POWELL. That is correct.

Mr. CHENOWETH. I might say to the gentleman that I also had a similar idea at one time, and I also suggested that some such approach be made to this project. As it has been repeatedly stated, they have not been able to work out a feasible project to include only the dam on the Arkansas River.

Mr. SISK. Let me say this—and there is one further question that I want to develop for the record, there is no other source of water on the eastern slope or in the vicinity of this project, whereby water could be secured to firm up this supply which is needed both by the irrigators and for municipal use?

Mr. TOMLINSON. That is right.

Mr. SISK. Pursuing that line of questioning a little further, what is the percentage of cost—I assume we have the information in the record, but I do not recall the figures—what is the percentage of the cost of the Fryingpan development and the intermountain diversion; what is the percentage cost of that?

Mr. TOMLINSON. You mean the cost ratio?

Mr. SISK. The percentage of the western slope development and that part of the development which is required for the intermountain diversion; what is the percentage of the total cost as constituted in that feature of the overall project; do you have such a figure as that?

Mr. TOMLINSON. The tunnel and the collection on the western slope is approximately $50 million. I can give you the exact figures but I do not have them with me.

Mr. SISK. And the total cost of the project is how much?

Mr. TOMLINSON. $156 million.

Mr. SISK. $156 million?

Mr. TOMLINSON. Yes.

Mr. SISK. In other words, the cost of the western slope development would run approximately one-third of the total cost of the project?

Mr. TOMLINSON. Yes.

If you wish, I can refine those figures, but that is roughly correct.

Mr. SISK. I am sure they are in the record, but I do not have them before me this morning, and as you know, these hearings have been rather a stopgap proposition and it is a little hard to call them to mind.

And the actual water to be transferred there is about 69,000 acre-feet?

Mr. TOMLINSON. On the average, yes.

Mr. SISK. At a cost of approximately one-third of the total cost?

Mr. TOMLINSON. Yes.

Mr. SISK. And that transmountain diversion then—that is necessary in order to firm up the supply both for irrigators and for municipal users in the Arkansas Valley?

Mr. TOMLINSON. Yes, that is correct.

Mr. SISK. Mr. Chairman, I yield back the balance of my time.

Mr. ASPINALL. Thank you very much.

The Chair understands that the gentleman from Pennsylvania, Mr. Saylor, will not be here this morning although he had notice of the hearing.

The gentleman from California, Mr. Hosmer, is not here this morning and he had notice of the hearing. I think I am correct in understanding that those gentlemen had asked for some time.

The Chair now recognizes the gentleman from Colorado, Mr. Chenoweth.

After he has finished, if there is any remaining time, and others wish to ask questions, the additional time may be used for that purpose.

Mr. CHENOWETH. Mr. Chairman, I want to again express my appreciation to the members of the committee and particularly to Mr. Sisk, the gentleman from California, for his interest in this project, and for his effort to obtain information concerning this project. I do appreciate it very much.

Now, Mr. Tomlinson, I want to go into one further feature of this project, about which there has been some question raised, and that is the available supply of water.

Mr. TOMLINSON. Yes.

Mr. CHENOWETH. You will recall that there has been some question raised as to whether or not water is available for the Fryingpan project in the event that it is developed, and I would like to have you and the other members of the Bureau who are sitting at the table with you, tell this committee just what the figures show concerning the availability of water, how much water is available, and whether or not there will be an adequate supply of water for this Fryingpan-Arkansas project.

Mr. TOMLINSON. Mr. Chairman, I will be glad to attempt to answer that question.

In estimating the water for the western slope, the Bureau very carefully analyzed the records of the stream flow, the water rights that have been filed with the State engineer and every other piece of information dealing with that subject that we could find.

I have a number of exhibits and charts, hydrographs, and other material, which I would like to offer to the committee. It is a little too bulky to put into the record, I think, but I think the committee might like to have this information for its files.

I think it will prove conclusively that there is ample water supply for the Fryingpan-Arkansas project.

What we did was to go to the State engineer's office in Colorado and get every water right that is on record and it is a part of this material which I offer for the committee's file; we have a photostatic copy of every decree filed in the district involved, which is district No. 38, in the State enginer of Colorado's office.

We have plotted those. First we have divided them into three categories.

Category A were those which could not be conceivably affected by the project. By that I mean, a water right which, we will say, would be on Woody Creek, located on this map here [indicating], which would be in this area here. No matter how you would operate the project, it could not have any possible effect on that water supply.

The other two categories are "B" and "C." Category B, would include the water rights on the main stem of the Roaring Fork below the Aspen Reservoir, which could be served by the Aspen Reservoir. And we have plotted those with little green circles on this large chart. Now, if any member of the committee wishes, we have extra copies of this particular map if you would like to have them.

Mr. ASPINALL. Do you have them with you?

Mr. TOMLINSON. Yes; we have them with us. Would you like us to give them to the members of the committee?

Mr. ASPINALL. Yes, if you will just pass them around for the use of the members of the committee.

Then, the request which Mr. Tomlinson has made that the statements, charts, and other matters be submitted for the record, if there is no objection, it is so ordered.

(The material referred to follows:)

ROARING FORK RIVER BASIN WATER RIGHTS AND THE FRYINGPAN-ARKANSAS PROJECT

Existing reclamation law provides that Federal reclamation projects operate within the provisions of State water law. The Fryingpan-Arkansas project would obtain water rights through the Colorado appropriation system and would divert water in accordance with priority as administered by the Colorado Water Commissioners. No water right could be hurt. In addition, replacement studies for the Aspen Reservoir recognized project replacement obligation to insure certain contingent future uses such as additional industrial and irrigation consumptive use above Cameo on the Colorado River.

A tabulation of all existing water rights in the Roaring Fork River Basin was inspected and separated into three categories, as follows:

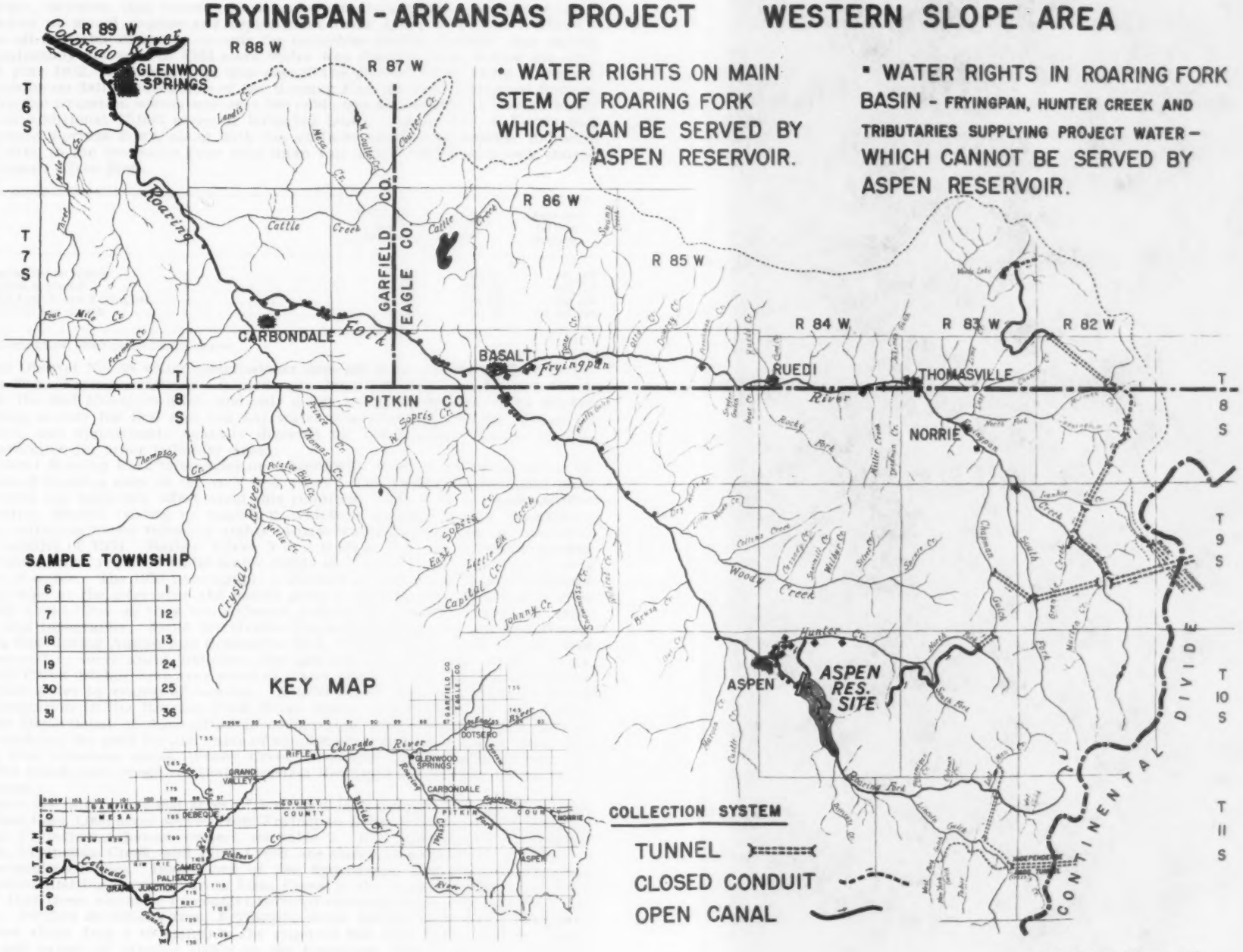
Category A: Rights on tributaries of Fryingpan and Hunter Creek and all other tributaries of Roaring Fork not supplying project water.

Category B: Rights on mainstem of Roaring Fork which can be served by Aspen Reservoir.

Category C: Rights in Roaring Fork Basin—Fryingpan, Hunter Creek, and their tributaries supplying project water which cannot be served by Aspen Reservoir.

About 88 percent of the water rights fall in category A and could not be physically affected by the Fryingpan-Arkansas project. Only about 3 percent of the existing rights are in category C. Category B and C rights are shown

FRYINGPAN - ARKANSAS PROJECT WESTERN SLOPE AREA



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R 88 W
R 87 W
CARBONDALE
SAMPLE TOWNSHIP
KEY MAP

on map marked "Exhibit 1" (which is included in the committee files), and tabulated as tables 1 and 2.

Aspen Reservoir would operate for project replacement during low-flow periods and could physically serve all ditches below the reservoir outlet. There is no evidence, however, that Roaring Fork mainstem ditches below Aspen are short of water or would require any replacement from Aspen Reservoir. Table 3 gives all available diversion records for mainstem ditches showing that during the extremely dry year of 1954 more water was diverted than during the very good year 1952. Although 1954 was one of the poorest water years of record, the minimum daily unused flow of the Roaring Fork River at Glenwood Springs during the irrigation season was over 300 cubic feet per second, or enough water for an additional 75,000 acres of irrigated land. Comparison of Norris and Glenwood Springs flows, along with the altitude-runoff relationships, indicates that even in the low-water year 1954 there was about 100,000 acre-feet unused Fryingpan River flows.

	Drainage area (square miles)	Runoff 1954	(Acre-feet) 1911–44 average
Fryingpan below Norrie	131	[1] 64,000	131,000
Fryingpan at mouth	275	100,000	225,000
Roaring Fork below Fryingpan	835	310,000	685,000
Roaring Fork at mouth	1,460	[1] 478,000	[1] 1,067,000

[1] Recorded flow, other quantities estimated.

The District No. 38 water commissioner does not keep records of ditch diversions from Fryingpan River. Records are kept for only one Hunter Creek ditch, the Red Mountain ditch, and only a few mainstem Roaring Fork ditches showing mainly the first and last day water was diverted, average rate of diversion, and approximate quantity diverted for the season. Similar records are available for other tributary areas.

Several Roaring Fork tributaries are chronically short of irrigation water by reason of location even in the very best years. The Fryingpan-Arkansas project could not have any effect upon this condition. There is no evidence that mainstem ditches (shown on exhibit 2, which is included in the committee's files) called on junior tributary rights to pass water during even the late summer months of 1954. Rather, tables 5 and 6 show that all mainstem ditches had water when required while senior rights on Woody Creek, see table 4, were short of water. The 1954 hydrograph (exhibit 3 in committee's files) of Hunter Creek flow at the gage near the mouth gives a good picture of probable 1954 Woody Creek flow as they are adjacent tributaries draining about the same area and topography. From the Hunter Creek hydrograph we see that Woody Creek flow during August and September 1954, was probably about 10 cubic feet per second to serve about 100 cubic feet per second of decreed rights. Thus, Woody Creek ditches were very short of water while junior mainstem priorities received water by reason of location. A 1950 report entitled "Value of Water for Irrigation in the Roaring Fork River Basin of Colorado" by the United States Department of Agriculture in cooperation with Colorado A. & M. College studying the need for and value of supplemental irrigation water deals only with four tributary areas, Woody Creek, Fourmile Creek, Cattle Creek, and Capitol Creek, and recognizes that mainstem Roaring Fork ditches are not short of water.

There are only about 300 acres of irrigated land served from Hunter Creek and less than 1,000 acres served from Fryingpan River below diversion features of the Fryingpan-Arkansas project, see table 2. 1954 hydrographs for Hunter Creek, Fryingpan Creek, and Lime Creek are shown as exhiibts 3, 4, and 5, in the committee's files. Inspections of the hydrograph and project operating principles limiting diversion from Lime Creek to the months of May and June show that there would be no conflict between existing rights and project diversions. Project diversions from Fryingpan River during 1954 would have been stopped about July 1 to maintain the required fish flow below Norrie. Location and extent of existing rights on the Fryingpan River definitely preclude any competition with project diversions even in 1954. Project divertible flow studies for the Hunter Creek area fully recognized existing water rights near the mouth including the power right, by limiting the diversion period. Proj-

ect diversions would have been stopped in 1954 some time during the last week of June.

This determination proves the legal availability of water for the Fryingpan-Arkansas project and this conclusion is supported by the April 1955 memorandum entitled "Hydrologic Studies, Western Slope Features, Fryingpan-Arkansas Project" by the Chief Engineer of the Colorado Water Conservation Board.

By letter of June 9, 1955, to Congressman Chenoweth, the State engineer, Mr. J. E. Whitten stated that he had checked the reports made by the Colorado Water Conservation Board as to the availability of supply for the Fryingpan-Arkansas project and found no reason to disagree with the conclusion that there is ample water to take care of all commitments together with 75,000 acre-feet for the project.

TABLE 1.—*Mainstem Roaring Fork water rights below Aspen Reservoir*

Name of ditch	Priority No.	Date	Cubic feet per second	Remarks
Lower	23	Apr. 15, 1882	1.50	
North Side Pioneer	30	May 15, 1882	1.00	
	73	July 20, 1883	2.40	
	404	Sept. 5, 1916	.89	
Robinson	38	June 15, 1882	5.00	
		Apr. 15, 1885	2.50	
	167	Nov. 15, 1886	2.00	
	212C	Apr. 25, 1899	10.70	
	326	Apr. 25, 1900	20.06	
Wheeler	44	Sept. 1, 1882	10.00	Above mouth of Hunter Creek.
Basin	49	Oct. 20, 1882	5.00	
	108	Mar. 27, 1885	5.00	
	137	Mar. 25, 1886	1.80	
	294	Mar. 1, 1890	33.20	
Robertson	52	Feb. 11, 1883	4.00	
	112	Apr. 1, 1885	3.50	
	595	Apr. 2, 1950	9.00	
Harris and Reed	78	Nov. 2, 1883	9.00	
	315	Nov. 2, 1890	15.273	
Gelder	5	Mar. 15, 1909	200.00	
	104BB	Oct. 1, 1884	1.50	
Atkinson	1A	Mar. 25, 1885	27.00	Power.
	6	Apr. 12, 1909	209.00	Do.
	105A	Dec. 20, 1884	4.20	
	107A	Mar. 25, 1885	1.00	
	228	Feb. 15, 1907	7.00	
	385	Apr. 12, 1910	2.13	
	594	Mar. 19, 1950	12.00	
Kester	113B	Apr. 1, 1885	6.30	
	268	Apr. 6, 1903	.69	
	268	do	.32	
	351	Apr. 5, 1904	9.565	
Crane and Peebles	113CA	Apr. 1, 1885	6.40	
	295	Apr. 1, 1890	5.60	
Kelso	114	Apr. 15, 1885	1.00	
	297	Apr. 15, 1890	2.84	
	447	Sept. 1, 1936	.70	Tributary of Roaring Fork.
Hyde	1B	Nov. 1, 1885	60.0	Power.
	9	June 2, 1913	60.0	Domestic.
Cravens	141	Apr. 15, 1886	5.00	
Grace and Shehi	142	Apr. 23, 1886	8.50	
1st Enl	302	Apr. 23, 1890	12.24	
Home Supply	179	May 27, 1887	20.00	
	261	May 1, 1905	15.00	
	261	do	5.00	
	377	Apr. 15, 1907	16.50	
Glenwood	213BBBA	Nov. 18, 1900	32.00	Domestic (also from Cattle Creek.)
1st Enl	339	Nov. 18, 1901	18.00	
Salvation	218A	Aug. 2, 1902	32.70	Above mouth of Hunter Creek.
	218A	do	25.30	
	429	Apr. 17, 1929	38.50	
John Ruedi	39A	June 15, 1882	2.1	
	325	June 5, 1899	3.13	
Lyons	226AAB–2	June 1, 1907	.5	
	407	Mar. 13, 1920	3.30	
Wheatley	259	May 15, 1895	3.30	
	260	June 1, 1902	1.00	
	367	Mar. 1, 1906	3.10	
Forker	262	June 1, 1886	2.70	
Enl	316	May 1, 1891	5.74	
	397	June 1, 1915	3.60	
Williams No. 1	263	May 1, 1890	1.30	
	317	May 1, 1891	2.14	

TABLE 1.—*Mainstem Roaring Fork water rights below Aspen Reservoir*—Con.

Name of ditch	Priority No.	Date	Cubic feet per second	Remarks
Flynn	273	Nov. 1, 1888	3.20	
	314	Nov. 1, 1890	4.80	
Slough ditch and Banning Lateral	274	May 31, 1884	6.58	
	309	May 31, 1890	42.68	
John Cerise	280	Mar. 29, 1885	3.00	
	364	Sept. 5, 1905	2.25	
Nellie Bird	281	June 9, 1885	3.94	Above mouth of Hunter Creek.
Cox and Henry	282	Sept. 1, 1885	3.00	Do.
	331	Sept. 1, 1900	3.00	
Riverside	287	June 1, 1888	3.00	
Smith No. 1	288	do	4.90	
Smith No. 2	289	do	4.90	
Union	265A	Apr. 20, 1884	9.44	
	301	Apr. 20, 1890	21.56	
Last Chance	319	May 1, 1893	3.00	
	371	May 2, 1906	4.00	
Nash and Peterson	332	Sept. 1, 1900	2.62	
	581	Aug. 14, 1948	9.0	
Eli Cerise 1st Enl	372	May 1, 1906	6.66	
John J	381	May 1, 1907	3.33	
Oxford No. 1	23A	Apr. 15, 1882	.80	
	394	Apr. 15, 1915	11.20	
Oxford No. 2	23A	Apr. 15, 1882	1.20	
	395	Apr. 15, 1915	10.80	
Patterson and Cummins 1st Enl.	405	May 15, 1918	3.00	
	210AAA	Nov. 20, 1893	4.50	
East Aspen City	434	May 1, 1932	6.00	Do.
Holstein	444	Aug. 26, 1936	2.23	
Paterson	445	do	6.30	
Vagneur-Durox	482	Aug. 23, 1946	16.50	
Harris	483	Sept. 3, 1946	.50	
Lesh	486	June 15, 1947	.917	
Cerise and Arbaney	498	June 26, 1947	5.0	
Grange and Cerise	537	Aug. 4, 1947	4.0	
	622	Apr. 1, 1951	4.0	
Havey	621	Mar. 30, 1951	1.0	
Hopkins Pump and Pipeline	629	Aug. 24, 1951	.25	Conditional.

Source: Colorado state engineer's office.

TABLE 2.—*Fryingpan and Hunter Creek water rights below Fryingpan-Arkansas project collection system*

Name of ditch	Priority No.	Date	Cubic feet per second	Remarks
Lime Creek (tributary of Fryingpan):				
Woods Lake Reservoir	507	July 5, 1947	15.0	Power—also 279.55 acre-foot storage decree.
P. J. E. & S. power pipeline.	544	Aug. 11, 1947	2.5	Power.
Fryingpan River:				
Fryingpan	60	Apr. 20, 1883	.30	
	313	Sept. 15, 1890	1.74	
Hall	208CCCB	July 1, 1890	.60	
Koch	178 and 253	July 1, 1911	20.0	
Mizer	292	Jan. 1, 1890	.26	
Dearhamer pipeline	318	Feb. 27, 1893	.50	
L. & A	333	Sept. 3, 1900	2.43	
Alvin Sloss	344	May 1, 1902	3.04	
Edith	353	May 1, 1904	2.72	
Nast ditch and pipeline No. 1.	368	May 1, 1906	2.0	Domestic. South Fork of Fryingpan.
			.25	Power.
Nast ditch and pipeline No. 2.	369	do	2.0	Domestic.
			1.85	Power.
Troy	427	May 10, 1928	10.80	
Crowley Fryingpan	546	Aug. 12, 1947	3.3	
Hendricks fish pond and pipeline.	630	Sept. 1, 1951	.39	2 acre-foot storage also.
Hunter Creek (tributary of Roaring Fork):				
Red Mountain	90	May 15, 1884	2.00	
	205	Nov. 27, 1888	13.00	
	227B	Apr. 3, 1909	5.59	
	400	Sept. 3, 1915	4.31	
Hunter Creek flume and pipeline.	284	June 10, 1886	15.00	
Red Mountain pipeline	576	Sept. 11, 1947	4.26	No location shown.
McFarlane	479	Aug. 4, 1946	15.30	
Bradshaw No. 2	487	June 16, 1947	.624	Do.
Loughran	488	June 17, 1947	1.76	Do.
Overflow	491	June 19, 1947	1.0	Do.
Durox	492	June 20, 1947	3.0	
Little William	500	June 28, 1947	.664	Do.
Huston	530	July 28, 1947	4.0	
Evans No. 2	607	Aug. 5, 1950	4.0	
	639	May 14, 1952	2.34	Conditional.

Source: Colorado State engineer's office.

TABLE 3.—*1954 and 1952 diversions, Roaring Fork (mainstem) ditches*

Name of ditch	1954 diversions		1952 diversions	
	Acre-feet	Last day of diversion	Acre-feet	Last day of diversion
Last Chance	960	Oct. 1		
Wheatley	1,440	do		
Kester	2,400	do	3,600	Oct. 1
Grace and Shehi	4,050	Oct. 15	3,600	Do.
Home Supply	18,360	Sept. 25	9,600	Do.
Robinson	9,181	Oct. 15	7,680	Do.
Harris and Reed	3,600	Oct. 1	4,320	Do.
North Side Pioneer	960	do	160	Do.
Basin	8,100	do	7,200	Do.
Slough	3,600	do	6,300	Do.
Kelso	840	do	720	Do.
Crane and Peebles	2,400	Oct. 15	1,440	Do.
Glenwood	12,000	Oct. 1	9,600	Do.
Robertson	1,800	do	1,800	Do.
Atkinson Canal	1,680	do	1,080	Sept. 1

Source: Colorado Water Commissioner District No. 38 Field Books.

TABLE 4.—*Woody Creek water rights*

Name of ditch	Priority No.	Date	Cubic feet per second	Remarks
Woody Creek decrees:				
Waco	1	June 18, 1880	4.00	
	105	Mar. 2, 1884	5.75	
	145	May 1, 1886	None	
	403J	June 1, 1916	13.19	
	463	Sept. 1, 1936	15.26	
Little Woody	11	May 17, 1881	1.00	
Walthen	65	May 10, 1883	3.00	
	88	May 4, 1884	3.20	
	403K	June 1, 1916	10.80	
Miller	104	Sept. 1, 1884	.40	
Paradise	192	June 14, 1888	3.00	
	428	June 1, 1928	18.00	
D'Avignon	203	Sept. 24, 1888	2.80	
Natal	398	June 1, 1915	.28	
	403I	June 1, 1916	.63	
Natal Ditch No. 2	626	July 15, 1951	2.00	
Little Woody Creek decrees:				
Williams	119	May 18, 1885	.10	
1st enlargement	403C	June 1, 1916	.40	
Tierney	120	May 8, 1885	.20	
1st enlargement	469	May 15, 1940	.60	
Clavel	159	June 15, 1886	1.80	
1st enlargement	403B	June 1, 1916	1.70	
D'Avignon 2d enlargement	213C	May 1, 1901	.659	
Martin Scott	213D	May 1, 1901	.224	
1st enlargement	403A	June 1, 1916	3.65	
Vagneur enlargement of D'Avignon	221B	Apr. 15, 1905	1.5	
Scott (extension of D'Avignon)	221B	Apr. 15, 1905	1.5	
1st enlargement (3d D'Avignon)	458	Sept. 1, 1936	2.5	
Harmon	320	Nov. 15, 1893	.79	
	403D	June 1, 1916	.18	
	478	May 10, 1946	2.00	
Little Woody 1st enlargement	403E	June 1, 1916	1.50	
D'Avignon 4th enlargement	477	May 8, 1946	1.00	

Source: Colorado State engineer's office.

TABLE 5.—*1954 Woody Creek diversions*

Ditch	Priority No.	Cubic feet per second	Diversions		Acre-feet diverted	Acres irrigated
			Last day water used	Average cubic feet per second diverted		
Waco	1	4.00	Sept. 15	11	2,640	500
	105	5.75				
	145	None				
	403J	13.19				
	463	15.26				
		38.20				
Little Woody	11	1.00	Sept. 1	1	240	50
Walthen	65	3.00	Sept. 15	5.5	1,320	300
	88	3.20				
	403K	10.80				
		17.00				
Paradise	192	3.00	Aug. 15	3	360	150
	428	18.00				
		21.00				
D'Avignon	203	2.80	Sept. 1	1.5	315	75
Clavell	159	1.80	Sept. 15	1.8	432	90
	403B	1.70				
		3.50				
Martin Scott	213D	.224	Aug. 1	1	120	30
	403A	3.65				
		3.874				

Source: Colorado Water Commissioner District No. 38 field books.

TABLE 6.—*1954 Roaring Fork diversions*

River-mile below Woody Creek	Ditch	Priority No.	Diversions: Cubic feet per second	Diversions: Last day water used	Diversions: Average cubic feet per second diverted	Acre-feet diverted	Acre-feet irrigated
3	Last Chance	319	3.00	Oct. 1	3.5	960	215
		371	4.00				
			7.00				
5	Wheatley	259	3.30	do	6	1,440	415
		260	1.00				
		367	3.10				
			7.40				
7	Kester	113B	6.30	do	10	2,400	450
		268	.69				
		268	.32				
		351	9.565				
			16.875				
	(Snowmass Creek enters)						
10	Grace and Shehi	142	8.50	Oct. 15	15	4,050	610
		302	12.24				
			20.74				
11	Home Supply	179	20.00	Sept. 25	60	18,360	1,225
		261	15.00				
		261	5.00				
		377	16.50				
			56.50				
	(Fryingpan River enters)						
14	Robinson	38	5.00	Oct. 15	34	9,181	805
			2.50				
		167	2.00				
		212C	10.70				
		326	20.06				
			40.26				
15	Harris and Reed	78	9.00	Oct. 1	15	3,600	450
		315	15.273				
			24.273				
15	North Side Pioneer	30	1.00	do	4	960	215
		73	2.40				
		404	.89				
			4.29				
18	Basin	49	5.00	do	30	8,100	590
		18	5.00				
		137	1.80				
		294	33.20				
			45.00				
22	Slough	274	6.58	do	15	3,600	500
		309	42.68				
			49.26				
22	Kelso	114	1.00	do	3.5	840	75
		297	2.84				
		447 [1]					
			3.84				
25	Crane and Peebles	113CA	6.40	10-15	8	2,400	320
		295	5.60				
			12.00				
26	Glenwood	213BBBA	32.00	10-1	50	12,000	1,600
		339	18.00				
			50.00				

See footnotes at end of table.

TABLE 6.—*1954 Roaring Fork Divisions*—Continued

River-mile below Woody Creek	Ditch	Priority No.	Cubic feet per second	Diversions		Acre-feet diverted	Acre-feet irrigated
				Last day water used	Average cubic feet per second diverted		
	(Crystal River enters)						
30	Robertson	52	4.00	10-1	7.5	1,800	375
		112	3.50				
		595	9.00				
			16.50				
37	Atkinson	105A	4.20	do	7	1,680	350
		107A	1.00				
		228	7.00				
		385	2.13				
		594	12.00				
			26.33				

[1] Tributary.

Source: Colorado Water Commission District No. 38 field books.

MEMORANDUM, APRIL 1955

To: Ivan C. Crawford.
From: R. M. Gildersleeve.
Subject: Hydrologic studies—Western Slope features, Fryingpan-Arkansas project.

When a preliminary report on the Fryingpan-Arkansas project was first submitted to this office, the diversion area included about 77 square miles on Fryingpan Creek, north Fork of Fryingpan Creek, and North Fork of Hunter Creek. The runoff originating above the diversion had to be estimated from records of streamflow of Fryingpan Creek (River) at Norrie and North Fork of Fryingpan Creek (River) near Norrie. These records were available for only 6 or 7 years, or 1911 through 1916. The period used in the project study was 1911–44, and the extension of such a short period of record might be subject to considerable error.

Consequently, an independent study was made by the engineering staff of the Colorado Water Conservation Board. Mr. F. C. Merriell, of the Colorado River Water Conservation District, also made an independent study. The average for the 1911–44 period, according to the estimates made at that time, were as follows (units 1,000 acre-feet):

	United States Bureau of Reclamation	Merriell	Colorado Water Conservation Board
North Fork of Fryingpan near Norrie	39.4	38.9	42.2
Fryingpan at Norrie	88.7	94.3	90.6
Total	128.1	133.2	132.8
Runoff originating above diversion (1,000 acre-feet):			
North Fork Fryingpan Creek	15.7	16.8	15.6
Fryingpan Creek	64.2	68.2	67.0
North Fork Hunter Creek	5.6	6.2	5.8
Total	85.5	91.2	88.4

As a result of these checks it appeared that the Bureau water supply study was reasonable. The original project plan was later modified by addition of 9.2 square miles of North Fork drainage area and 8.6 square miles on Lime Creek making a total of 95 square miles, with the runoff originating above the diversion estimated to average 104,100 acre-feet. The project was extended in order to provide for recommended residual fish flows which were in excess of those which had been contemplated in the original studies. The amount of the runoff originating above the diversion which could actually be diverted was

finally estimated by the Bureau to average 69,200 acre-feet for the 1911–44 period, exclusive of an average annual amount of 5,000 acre-feet which could be diverted by the existing Busk-Ivanhoe Tunnel. This estimate was based on studies of peak runoff in excess of canal and tunnel capacities which would be spilled from the system and on allowances for water which would be bypassed to meet fish flow requirements. The basis of these studies appeared to be logical to members of the engineering advisory committee which had been appointed in May 1949 by the policy and review committee set up by the water conservation board to study and make recommendations on the project to the board. The members of the engineering committee were R. J. Tipton, chairman, C. H. Jex, B. F. Powell, F. C. Merriell, J. R. Riter, and myself.

Another feature of the project in which the Colorado Water Conservation Board took an active part was with respect to the additional water which could be diverted from the Roaring Fork through the existing Twin Lakes Tunnel as a result of the contemplated project enlargment of the existing Twin Lakes Reservoir in the headwaters of the Arkansas. These additional diversions could be put through some of the project powerplants to increase the potential generation by the project, although the water itself would actually be earmarked for the owners of the tunnel and original reservoir, and the diversions would be made under their existing priority rights. The Colorado Water Conservation Board staff made a check study of the Bureau estimates of such possible additional diversions. This study was adopted by the Bureau in lieu of its original estimates, as a part of the project report.

The engineering committee mentioned above was assigned the task of determining the replacement capacity in Aspen Reservoir which would be required in the operation of the west slope diversion features of the project. Criteria for the study were set up by the committee as a whole, and the actual work was performed by the Colorado Water Conservation Board staff. The criteria used and the results of the study are contained in a memorandum by the committee dated July 16, 1949. The replacement requirements were based on daily flow conditions which existed in the low runoff seasons 1934–35, 1939–40, and 1940–41. It was found that the largest replacement requirement for the 1911–44 period would be for the 1934–35 season, and would be 5,300 acre-feet for replacement of ultimate diversions by the Independence Pass (Twin Lakes) Tunnel, and 3,200 acre-feet for replacement of diversions by the Fryingpan-Arkansas system, or a total of 8,500 acre-feet. The storage requirement which would furnish a full supply, regardless of natural shortage in streamflow, to existing canals in the vicinity of Aspen amounted to 5,800 acre-feet for the 1934–35 season.

In the same study the required storage capacity for certain contingent uses was determined to be 9,100 acre-feet. On the basis of this study the engineering advisory committee recommended construction of the Aspen Reservoir to its full physical capacity of about 28,000 acre-feet.

The replacement requirements were calculated not only for full development of water facilities existing and authorized at the time, but contemplated some future uses in amounts agreed upon at that time by the advisory committee. These amounts were 90,000 acre-feet annually for depletions by lands to be irrigated in the future above Cameo, and 300,000 acre-feet annually for depletions by future industrial uses above Cameo. The projects existing and authorized at the time included Grand River Ditch, Moffat, and Jones Pass Tunnels, Colorado-Big Thompson project and Independence Pass (Twin Lakes) Tunnel. As previously mentioned, allowance was made in the study for full development of these projects. Allowance was also made for a total irrigation and power demand of 943,200 acre-feet annually.

The 1954 water year was also one of very low runoff. As a check against the replacement requirement as contained in the memorandum of July 16, 1949, a study was made on the same basis for the 1954 season. The results of this study, as compared with the maximum requirements arrived at for 1934 streamflows were as follows:

Replacement requirements (1,000 acre-feet)	1954	1934
Ultimate Independence Pass diversions	5.0	5.3
Fryingpan-Arkansas diversions	1.4	3.2
Subtotal	6.4	8.5
Supply natural shortages: Canals at Aspen	5.0	5.8
Total	11.4	14.3

The storage capacity necessary for contingent uses of 9,100 acre-feet according to the memorandum of 1949, was found to be ample on the basis of 1954 streamflows.

The replacement requirement represents the storage capacity necessary to replace to the stream the amounts of water which would be diverted by the rehabilitated Independence Pass system and the Fryingpan-Arkansas collection system at times when such divisions would not be possible because of streamflows at Cameo less than the demands at that point. The maximum amount which would need to be replaced would be, of course, the total amount which was being diverted at the time, and this replacement would return the streamflow back to its original or natural volume.

The requirement to supply natural shortages for canals at Aspen is the amount of storage capacity necessary, in addition to replacement capacity, to furnish an ideal supply to those canals at times when the natural streamflow would be below the ideal requirements. It represents a further use which could be made of the total capacity available at the Aspen Reservoir site.

There are other uses which the engineering committee considered might be made of the physical capacity of Aspen Reservoir if certain future developments should occur. The capacity required for these uses, as shown in the 1949 memorandum, was 9,100 acre-feet. Our study indicates that this capacity would suffice for those uses under 1954 streamflow and diversion conditions.

An analysis of flows in the Roaring Fork and demands at Aspen and at Cameo was also made to estimate the amounts of water which would be available in Aspen Reservoir to take care of the requirements for the 1934 and 1954 seasons. It appears that the reservoir would have filled by July 1, 1933, and replacement requirements for that season would have amounted to 3,600 acre-feet and the amount necessary to supply natural shortages of the Aspen canals would have been only 600 acre-feet. An additional 15,000 acre-feet would have been storable by June 1, 1934, with replacement and natural shortage requirements for that season being 14,300 acre-feet. The reservoir would have refilled in 1935.

With regard to the 1954 season, the reservoir would have stored some 25,000 acre-feet in 1953. Replacement and natural shortage requirements would have been 2,500 acre-feet. An additional 10,000 acre-feet could have been stored in 1954. The replacement and natural shortage requirements in the 1954 season were 11,400 acre-feet.

It would appear that for either 1934 or 1954 there would be ample carryover to take care of the replacement and natural shortage items, with additional water in 1934 for contingent uses. Records are not yet available to determine the amount which might be storable at Aspen in 1955.

It may be concluded that, on the basis of present uses and full development of authorized and existing projects, there is water available for some diversion and full replacement by the Fryingpan-Arkansas project in even the driest years of record. This is also true if such future uses as were considered by the engineering committee in 1949 are also placed on the water supply. As a matter of information, the Denver-Blue River diversion and full development of the Cliffs-Divide projects were also considered. If these were to be built, the replacement requirement for Aspen Reservoir would have been 12,200 acre-feet in 1934, and 11,100 acre-feet in 1954. The storage capacities required to supply natural shortages of the Aspen canals and for contingent uses would remain the same. The indication is that the 28,000 acre-foot capacity of Aspen Reservoir would be sufficient.

Mr. TOMLINSON. I think it would be helpful if it were. I was not going to impose upon the committee by suggesting that but I think it would be well if your staff would pick out of that any material that they thought would be helpful for the record, and have it inserted in the record along with other collateral material and charts and matters of that kind.

Mr. ASPINALL. Without objection, the charts submitted by Mr. Tomlinson will be filed.

The Chair hears none and it is so ordered.

Mr. CHENOWETH. Mr. Chairman, I have a letter here from the State engineer of Colorado, addressed to me under date of June 9, 1955,

relative to the water supply that would be available for the Fryingpan-Arkansas project. I ask unanimous consent that that be made a part of the record at this point.

Mr. ASPINALL. Without objection, it is so ordered.

(The letter referred to follows:)

STATE OF COLORADO,
OFFICE OF STATE ENGINEER,
DIVISION OF WATER RESOURCES,
Denver, June 9, 1955.

Subject: The Fryingpan-Arkansas project.

Hon. J. EDGAR CHENOWETH,
Colorado Representative,
House of Representatives, Washington, D. C.

DEAR MR. CHENOWETH: The attention of this department has been called to the fact that certain allegations have been made before the committee now holding hearings in regard to the Fryingpan-Arkansas transmountain diversion project. It seems that some question has arisen as to the reliability and authenticity of hydrographic records introduced in evidence.

May I point out that the State of Colorado has, at the present time, and has had for many years past, a cooperative agreement in effect with the United States Geological Survey for obtaining, exchanging, and publishing hydrographic records of the State. We therefore accept the USGS's records as official in this State, and the USGS in return accepts the records of the State engineer. We therefore see no reason for records obtained by either the Geological Survey or the State engineer being questioned as to authenticity or reliability. The United States Bureau of Reclamation uses these records in many of its studies, and this is also true of the Colorado Water Conservation Board, who made an independent study of the availability of supply for the Fryingpan-Arkansas project. In fact the only hydrographic records available in this State, until a few years ago, were those obtained principally by the hydrographic department of the State engineer's office. This office is charged with the responsibility of administering the decreed water rights throughout the State, and records obtained from the gaging stations maintained by the State and the USGS are recognized as official, and used in our official administrative service.

I have checked the reports made by the Colorado Water Conservation Board as to the availability of supply for the Fryingpan-Arkansas project and find no reason to disagree with their conclusion in this matter, to wit: That there is ample water to take care of all commitments, together with the 75,000 acre-feet which will be required by the Fryingpan-Arkansas project.

I trust that this information may be of some help, and that you will be successful in your efforts to have this project approved.

Very truly yours,

J. E. WHITTEN,
State Engineer of Colorado.

Mr. ASPINALL. You may proceed, Mr. Tomlinson.

Mr. TOMLINSON. The second category of water rights shown on this map in the green circles shows the water rights from the main stem of Roaring Fork, which could be served by the Aspen Reservoir. Now, those circles I would like to explain to the committee, have been plotted by our draftsmen by river miles, and on checking them, I find that some of them are shown on the wrong side of the river. The river miles where they are put are in the right position, but does not necessarily indicate whether the canal is on the right or left side. I wanted to point that out in case someone was looking for a particular place and saw it on the wrong side of the river.

I might add that 88 percent of all the water rights found in this category could not possibly be affected at all by this project.

In the second category, about 9 percent; and if the Aspen Reservoir were built at such a size, namely 28,000 acre-feet, which more than adequately meets all the requirements of the Colorado State law for

replacement storage, it would provide for improving existing rights as well as maintaining them, and also provide a large cushion for the expanded development for municipal and industrial use on the western slope.

The other category, which we call category C for this particular discussion, are those water rights in the Roaring Fork Basin, the Fryingpan, Hunter Creek and their tributaries, supplying project water, which cannot be supplied by Aspen Reservoir. And we have marked those with red squares, such as you see down here on Hunter Creek, and up here on Fryingpan River itself, and on Lime Creek.

Mr. CHENOWETH. What do those marks mean?

Mr. TOMLINSON. Those marks indicate that the water rights cannot be replaced by the Aspen Reservoir, by virtue of their location.

Mr. CHENOWETH. Because they are above it?

Mr. TOMLINSON. They are above it; they are above or off on another stream.

Mr. CHENOWETH. I see.

Mr. TOMLINSON. And the project plan is fully to respect those rights. In other words, if there is not enough water flowing into the stream to serve those water rights, and to make any diversion, there will be no diversion. And the whole hydraulics of the project is based on that particular principle.

Mr. CHENOWETH. And as I understand you, Mr. Tomlinson, the construction and the operation of the Fryingpan-Arkansas project will not, in any way, interfere with any of the decreed water rights on the western slope.

Mr. TOMLINSON. That is absolutely right. And I can go one step further. In category B it will not only not adversely affect them, but very probably it will beneficially affect them.

Mr. CHENOWETH. In other words, those below the reservoir will have their water rights firmed up with this project?

Mr. TOMLINSON. That is right.

Mr. CHENOWETH. And will have greater assurance of water than they now have?

Mr. TOMLINSON. That is right. There will be no adverse effect to any single right; there will be some beneficial effect on some of them.

Mr. CHENOWETH. When some of the Aspen witnesses were here, I gained the impression from some of them, that they were apprehensive that some of their water rights would be taken away from them. Now is that true?

Mr. TOMLINSON. That is not true; you will recall that when some of the witnesses, I believe——

Mr. ASPINALL. Will the gentleman yield?

Mr. CHENOWETH. I gladly yield.

Mr. ASPINALL. Mr. Tomlinson, you do not mean in your statement to say that they did not have any apprehension that they would not lose some of their water rights, because the record shows that they did have some apprehension.

Mr. TOMLINSON. You are absolutely right. What I was going to say was, that they said they had an apprehension, but when someone asked the question—I believe it was Mr. Sisk, although I am not certain—but when one of the gentlemen on the committee asked questions, they immediately said they were not engineers, they were not hydrolo-

gists, they were not qualified to answer, but they did have their apprehensions, and they wanted those apprehensions resolved.

And that is what I am trying to do today, to say that we have checked this matter pretty carefully; we not only have checked it ourselves but we have checked with the State engineer, the Colorado Water Conservation Board, and others and have found that our estimates of available water supply was even more conservative than any of the independent checks. Some of the material which I left with the committee goes into that situation.

Mr. ASPINALL. Now, if the gentleman will yield to me again.

Mr. CHENOWETH. I gladly yield.

Mr. ASPINALL. In other words, the chart shows, and your view is, that none of the water that will be taken out for the Fryingpan-Arkansas project has any adverse effect on the water rights existing, where there is need for that water?

Mr. TOMLINSON. That is right. The whole project is formulated on that basis.

Mr. CHENOWETH. Mr. Tomlinson, as I understand you, the situation, which the witnesses were disturbed about will be resolved and there is no foundation for their apprehensions.

Mr. TOMLINSON. That is right; I certainly think so. And if I were where those people are—and I can share their concern; if I were there, and did not know the facts, I would also be concerned about it, because they depend upon these water supplies as a means of livelihood. However, I think if I were sitting in their place, I would feel even better with the Aspen Reservoir sitting above me, then I would without the project, and without Aspen Reservoir.

Mr. CHENOWETH. And in other words, the water that goes into the Fryingpan-Arkansas project is surplus and over and above that which present users require?

Mr. TOMLINSON. Yes.

Mr. MILLER. Will the gentleman yield?

Mr. CHENOWETH. Yes.

Mr. MILLER. On this chart which you have handed us entitled, "Fryingpan-Arkansas Project, Western Slope Area"——

Mr. TOMLINSON. Dr. Miller, that is the same as the one shown on the board here.

Mr. MILLER. Yes. There are listed 19 of these so called water rights areas in red squares, I think. Is that right, 19?

Mr. TOMLINSON. Yes, that is about the number.

Mr. MILLER. Do I understand from your statement that those areas will continue to get their water, that their water rights are not affected?

Mr. TOMLINSON. In no way whatever.

Mr. MILLER. In anyway whatsoever?

Mr. TOMLINSON. That is right.

Mr. MILLER. Is that the water rights they are using as of now?

Mr. TOMLINSON. Yes.

Mr. MILLER. Or what they might use in the future?

Mr. TOMLINSON. The water rights which they have decreed to them. In many cases, they are not using their full decreed rights, but we have made allowance for the full decreed rights. Of course, if there is not water in the stream at those points, we cannot put addi-

tional water in there, but we will not take any water out of the stream when they have any right whatsoever to the water.

Mr. ASPINALL. If the gentleman will yield to me again?

Mr. CHENOWETH. I gladly yield.

Mr. ASPINALL. What about the additional water rights also?

Mr. TOMLINSON. They have been taken care of.

Mr. ASPINALL. And the proposal of the Fryingpan-Arkansas project with respect to those also?

Mr. TOMLINSON. Yes.

We have been extra cautious and extra conservative; and, as I said, all of the official studies themselves, the State studies and the official western slope studies, have shown more water than we have claimed not by a large amount, but nevertheless, a slightly larger amount than we have claimed.

Mr. CHENOWETH. I would like to have you go into another matter, that of the amount of water. Do you have some figures showing the totals?

Mr. TOMLINSON. We have made these studies, we have checked with all of the records, and there is no reason, we think, to doubt that these figures are correct. The letter which you just introduced into the record from the State engineer, as late as this last month, states again that he has checked our figures and he has no reason to doubt the availability of water for this project.

Mr. ASPINALL. The letter to which the gentleman has referred, and which the gentleman from Colorado, Mr. Chenoweth, asked unanimous consent to have included in the record, will be made a part of the record.

The Chair hears no objection, and it is so ordered.

Mr. TOMLINSON. That project is based on an average of 69,000 acre-feet diversion. That amount will vary from year to year; it might be up to a little over 100,000, or it might go down as low as 25,000. We have gone into the various detailed studies on that; we have planned our project to use the water when it is available and to store it in years when we have a little above the average, and then use that carryover when we are below average, so that we come up with an average of about 69,000 acre-feet for the average annual diversion.

Now, it was brought up before, I think at the hearings, that we do not allow for the Highline Canal which uses the Busk-Ivanhoe tunnel which goes through the Continental Divide, at approximately the same location as the project tunnel. We have made full allowance for that. That particular tunnel is very high; it has about 5 square miles of drainage area and there has been full allowance for the non-project diversion of all of that water.

Flow fluctuations were allowed for and determined in fixing the economic canal capacity capable of diverting the estimated project water supply. And only about three-fourths of the estimated annual runoff above the project collection system is considered divertable. Base flow and priority and fishing flows are included in the other one-fourth of the runoff. We are definitely respecting the operating principles, which have been a subject of much discussion before this committee, and there is no suggestion whatsoever that the project will not be operated in full compliance with those principles. The op-

erating principles will be included in the contract with the conservancy district.

Mr. CHENOWETH. In other words, in your opinion, Mr. Tomlinson, the operation of the project under those principles will fully protect the water users on the western slope?

Mr. TOMLINSON. I do not think there is any question about it.

Mr. CHENOWETH. And it will not interfere with their present or future use of the water?

Mr. TOMLINSON. I do not think there is any question about it.

Mr. CHENOWETH. And it will not take any water away which they are now enjoying?

Mr. TOMLINSON. That is right. And we will have water there available for expanded use in the future, too, over and above what they are using now.

Mr. CHENOWETH. That is, through the operation of the Aspen Reservoir?

Mr. TOMLINSON. That is correct.

Mr. SISK. Will the gentleman yield for a question?

Mr. CHENOWETH. I will gladly yield.

Mr. SISK. In view of the discussion relative to the availability of water for the Aspen Reservoir site——

Mr. TOMLINSON. Yes.

Mr. SISK. What is the normal flow of Roaring Fork at the Aspen site over a period of years; do you have figures showing the average flow?

Mr. TOMLINSON. It is about 112,000 acre-feet.

Mr. POWELL. 112,000 acre-feet.

Mr. TOMLINSON. 112,000 acre-feet, Mr. Powell tells me.

Mr. POWELL. And then they have Twin Lakes?

Mr. TOMLINSON. And from that, for Twin Lakes, which is a private development, is taken 50,000 acre-feet, which makes a remainder of about 60,000 acre-feet.

Mr. SISK. The free flow?

Mr. TOMLINSON. 112,000 acre-feet, less the diversion on the part of the Twin Lakes Co. of around 52,000, which would make around 60,000 net, after you take that off.

Mr. SISK. In other words, after all of the water has been diverted, that is in the immediate area, there is flow down the river on an average of 62,000 acre-feet per year; is that right?

Mr. TOMLINSON. That is right. I might add, that in 1954, which was an unusually dry year—it was almost as dry as the dryest of record, 1934—they ran neck and neck for the bottom figure of 1934; 1934 was a little bit more critical—there was ample water flowing out of the Roaring Fork River, at Glenwood Springs to irrigate about 75,000 acres of additional land over and above what was being irrigated at that time. So that there was that much water being wasted, so far as that basin of origin was concerned.

And they all claim over there, that 1954 is the most critical year in twenty-odd years. Now, we have more than——

Mr. SISK. Now, then, the difference between the 60,000, approximately 60,000, acre-feet and the annual average flow is going down the river, and you expect to pick up the balance through these various canals here of an amount, just taking the figure here, round figure of

69,000, or put it in round figures, 70,000 acre-feet, which you plan on diversion through the intermountain diversion; that is, that difference there will be picked up now where in the area? I think that is in the testimony here somewhere, but will you just refresh my memory as to where that comes from?

Mr. TOMLINSON. The project tunnel, sir, comes into the mountain at about this point [indicating] and takes the water from the Fryingpan River. And from the Fryingpan, it goes in this direction [indicating]. Then we have this additional tunnel, going south; we would have a tunnel going to the south fork and another going in this direction [indicating]; and another tunnel which would tap the north fork of Hunter Creek; and then we would have an open canal to Hunter Creek down here [indicating]—all of which, would tend to move the water from this tributory of Roaring Fork to Hunter Creek, up toward the canal tunnel in this directing here [indicating].

Mr. SISK. Now, let me ask this: How much water do you propose diverting, which actually would flow into the Fryingpan? Not including the Roaring Fork, because you are gathering, as I understand, water for this project that normally woulud flow into both Roaring Fork and Fryingpan?

Mr. TOMLINSON. Yes.

Mr. SISK. And you are getting those waters, and you intend to divert it through this intermountain tunnel?

Mr. TOMLINSON. That is right.

Mr. SISK. How much water is coming out of Fryingpan River?

Mr. TOMLINSON. Just one second; I will look that up.

Mr. SISK. I do not mean the exact figures, but just approximately.

Mr. TOMLINSON. Mr. Powell says about 66,000 acre-feet from the Fryingpan as distinguished from the Roaring Fork proper, and all of the remainder which is a small amount, out of Hunter Creek tributary to Roaring Fork. The figure here before me gives 4,000 acre-feet per year coming out of Hunter Creek which would be out of the Roaring Fork.

Mr. SISK. Yes.

Mr. TOMLINSON. And the remainder which includes the North Fryingpan, 5,600 feet from here [indicating], and 4,600 from Lime Creek up here [indicating].

Mr. SISK. In other words, better than 90 percent of the water comes out of Fryingpan?

Mr. TOMLINSON. That is right.

Mr. SISK. From all sources, including Roaring Creek?

Mr. TOMLINSON. That is correct.

Mr. ASPINALL. Will the gentleman yield to me?

Mr. CHENOWETH. Yes.

Mr. ASPINALL. Mr. Powell, there is one other thing that is troubling many people in that area, and that is, if you take too much water from the upper tributaries, that is, from Hunter Creek and some of the other creeks, that it would have a tendency to ruin the natural grazing area in that area; has the Bureau made any study of that, and if so, what are the intentions relative to protecting that matter?

Mr. TOMLINSON. The intentions are—and by the way, I might say that we are going to take a small amount—Mr. Sisk brought out in his questions—from the tributory of Roaring Fork proper.

Mr. ASPINALL. I understand that.

Mr. TOMLINSON. When the Aspen Reservoir is put in, it would not only protect that water, but the other water rights, and many of them are downstream from the contemplated Fryingpan and the Roaring Fork supplies.

Mr. ASPINALL. I understand, but in the upper reaches of the Hunter Creek, we will say, there are some valuable grazing areas and a little bit of water in certain years would dry up that range. Now this is a program to protect the users equally in that area?

Mr. TOMLINSON. The water we are taking is almost exclusively after the water passes the ranges themselves and goes into the streams and then it is diverted out by tunnel. And, as you will notice here, practically all of these are tunnels, that is, a major part of this is in tunnel. We do have some open canals on the various streams; we have some conduits, but the rest of it is tunneled from one channel to the other.

Mr. ASPINALL. You have been going around and around my question. What I want to know is, if it will be the plan of the Bureau and of the Fryingpan-Arkansas project, to protect those rangeland areas?

Mr. TOMLINSON. Yes, I will say the answer is "Yes," but we think there will be no damage done.

Mr. ASPINALL. Well, that is what I want to know.

Mr. TOMLINSON. The answer is "Yes."

Mr. ASPINALL. That is the answer I wanted to get in the record.

Mr. SISK. Will the gentleman yield for a further question?

Mr. CHENOWETH. Yes.

Mr. SISK. I just wanted to bring this up in regard to your question: Do I understand the rights of these people along this North Fork and these small creeks here, above Hunter Creek, are fully protected?

Mr. TOMLINSON. Fully protected. I can say categorically that any rights on the west slope are.

Mr. POWELL. Yes.

Mr. TOMLINSON. Every right on the west slope that would be involved by this project would be fully protected.

Mr. SISK. In other words, you cannot dry up the North Fork or Hunter Creek or any of these other creeks where the people are there presently enjoying the waters?

Mr. TOMLINSON. That is right. We are taking only surplus water.

Mr. SISK. Thank you.

Mr. ASPINALL. May I ask the gentleman to yield further?

Mr. CHENOWETH. Yes.

Mr. ASPINALL. As I understand it, you are taking water that can no longer be used for domestic grazing?

Mr. TOMLINSON. That is right. The only water would be the diversion or storage rights under the State law, and we have fully protected those rights.

Mr. CHENOWETH. Mr. Tomlinson, as I understood you, you stated that there is an adequate water supply available for this project.

Mr. TOMLINSON. That is right, and the record will indicate in the information which I have submitted, that our figures are more conservative than the checks that have been made by the State engineer.

Mr. CHENOWETH. And you now state to this committee, without equivocation, that a water supply is available for this project?

Mr. Jacobson, you have worked for many years on water problems of the upper Colorado River. In your opinion is there an adequate water supply for the Fryingpan-Arkansas project from the waters of the upper Colorado River?

Mr. JACOBSON. I would say categorically that there is adequate water for this project even before the construction of the storage facilities of the upper Colorado River project. There is no doubt as to the availability of the required amount of Colorado water needed for this project.

Mr. CHENOWETH. Then you state without reservation that there is adequate Colorado River water available at this time for the Fryingpan-Arkansas project?

Mr. JACOBSON. Yes, sir.

Mr. TOMLINSON. I do.

Mr. CHENOWETH. Is there any additional statement you wish to make?

Mr. TOMLINSON. No. But I am prepared, I think, to answer any questions which might come up on the project.

Mr. CHENOWETH. I thank you Mr. Chairman, for this time.

Mr. ASPINALL. May I say we have a few minutes left, if there are any further questions. Is the gentleman from Colorado through?

Mr. CHENOWETH. I think we are about through, Mr. Chairman.

Mr. ASPINALL. Does the gentleman from California, Mr. Sisk, have any more questions?

Mr. SISK. I believe that pretty well covers the questions that I had in mind, Mr. Chairman.

Mr. ASPINALL. Are there any questions which any other member of the committee wishes to ask?

The Chair wishes to thank the witnesses for their appearance this morning and I wish to express the appreciation of the committee for permitting us to finish this hearing.

Mr. CHENOWETH. Mr. Chairman, I also wish to express my appreciation to the chairman and the members of the committee for making it possible to hold this hearing.

Mr. ASPINALL. The gentleman from Colorado, Mr. Chenoweth, handed to the chairman a statement from the Water Development Association of Southeastern Colorado, in answer to the comments, the people of Aspen on the operating agreement, which is set forth in the agreement between the Colorado organization for the State of Colorado, relative to the operation of the Fryingpan-Arkansas project. A request was granted some time ago to include this statement in the record and the Chair now hands it to the clerk for that purpose, to be made a part of the hearings.

Mr. CHENOWETH. Will that be the last part of the record, Mr. Chairman?

Mr. ASPINALL. No. The Chair indicated that it will be inserted right after the statement of the representative from the Aspen area.

Mr. CHENOWETH. As I understand it, Mr. Chairman, this concludes the hearings and completes all of the testimony that will be taken?

Mr. ASPINALL. The chairman was about to announce that the hearings on the Fryingpan-Arkansas project are closed.

The hearings will be printed as soon as possible. The chairman respectfully requests that the corrections necessary in the record will be made as soon as possible.

Mr. CHENOWETH. I wish to thank the chairman for his courtesy in making this hearing possible.

Mr. ASPINALL. It is always a pleasure to work with my colleague from Colorado.

Mr. SISK. Mr. Chairman, I would like to thank the witnesses for coming back this morning. I want to express my appreciation of the testimony and I am sorry that my request may have caused them to come back. Of course, I understood others had some questions they wanted to ask.

Mr. CHENOWETH. We appreciate the gentleman's interest in the project.

Mr. ASPINALL. I want to assure the gentleman that he was not alone the cause of having these gentlemen come back.

If there is nothing further to add, the Chair declares the hearings at an end.

(Whereupon, the hearings were concluded at 10:35 a. m.)

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